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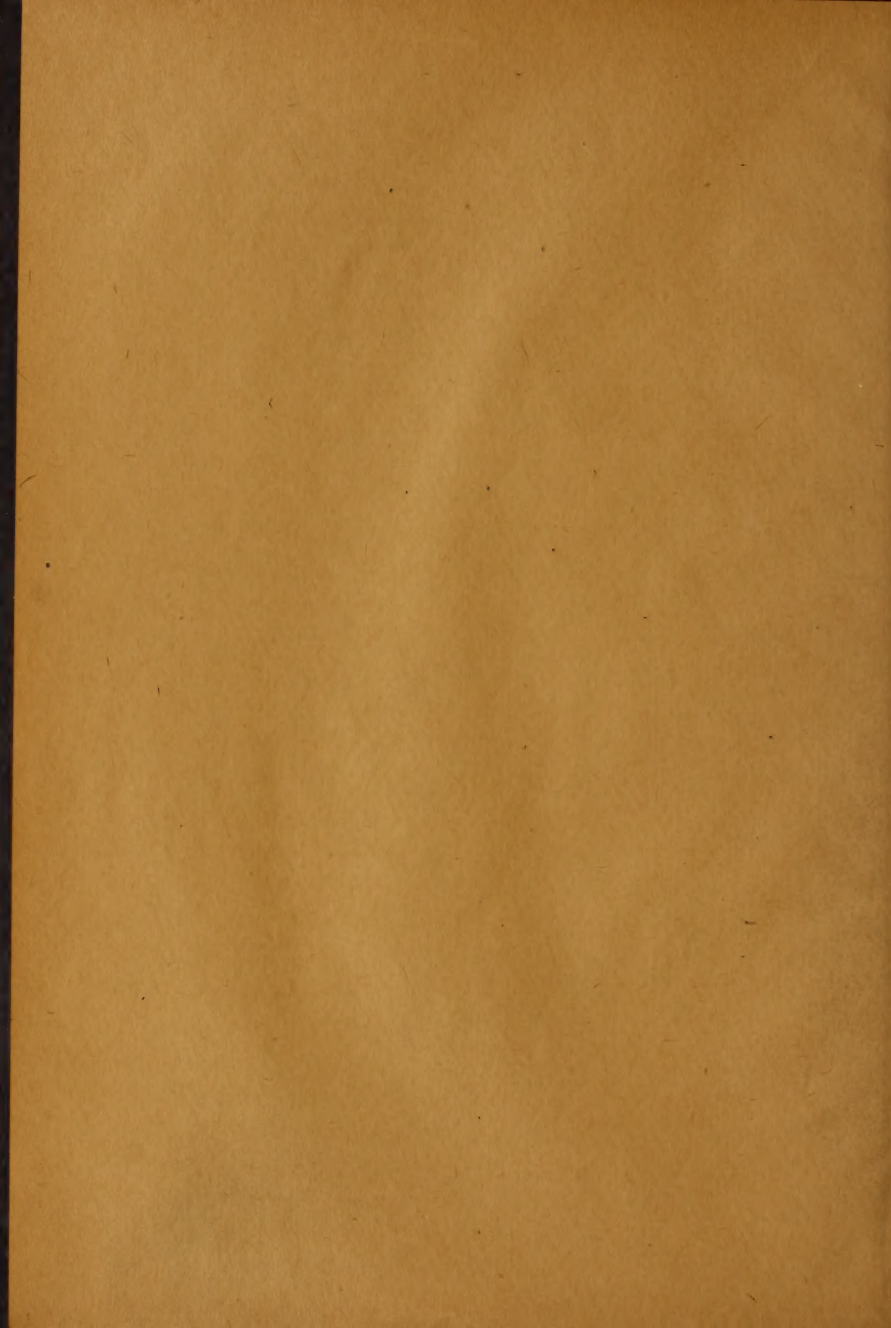


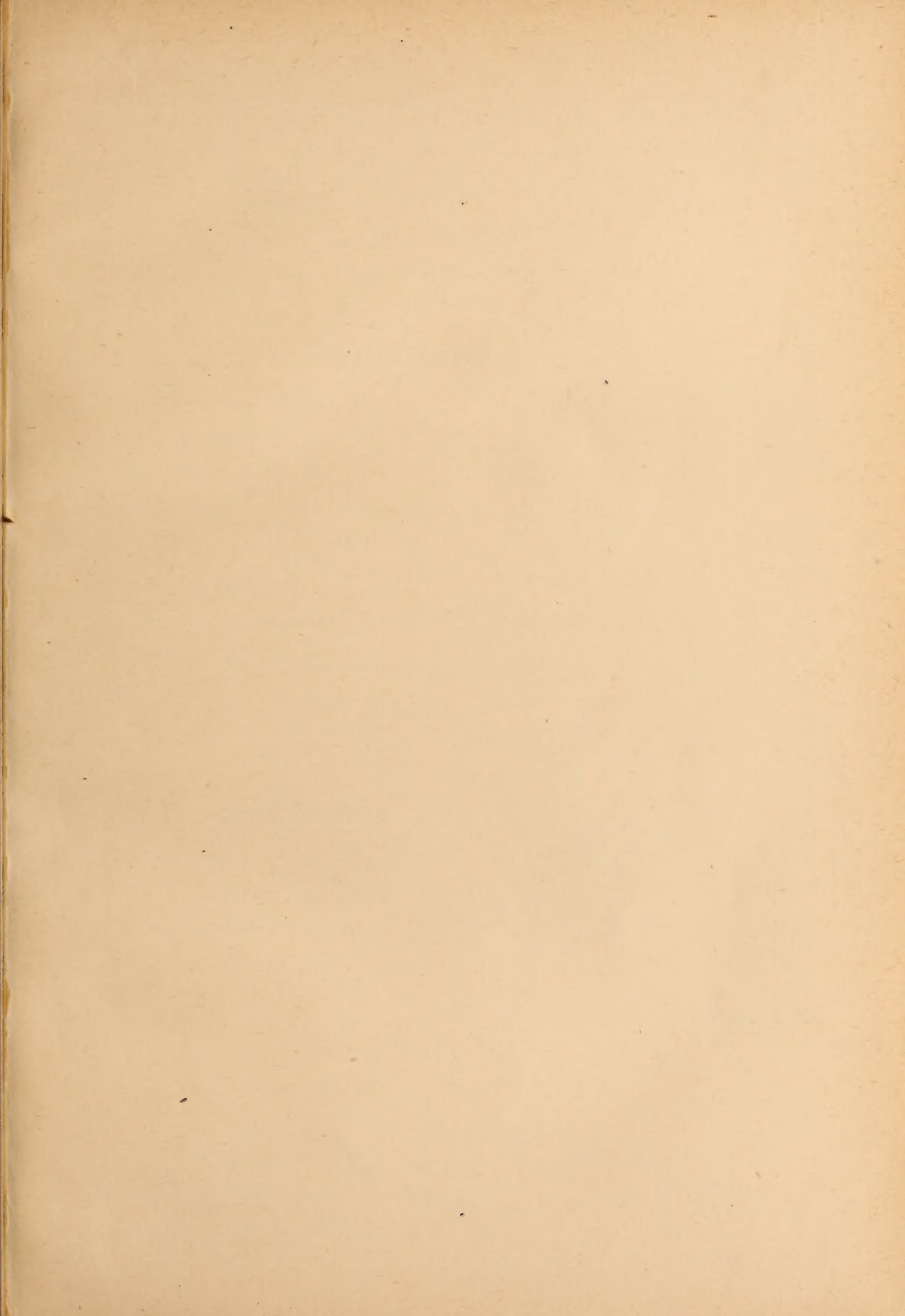
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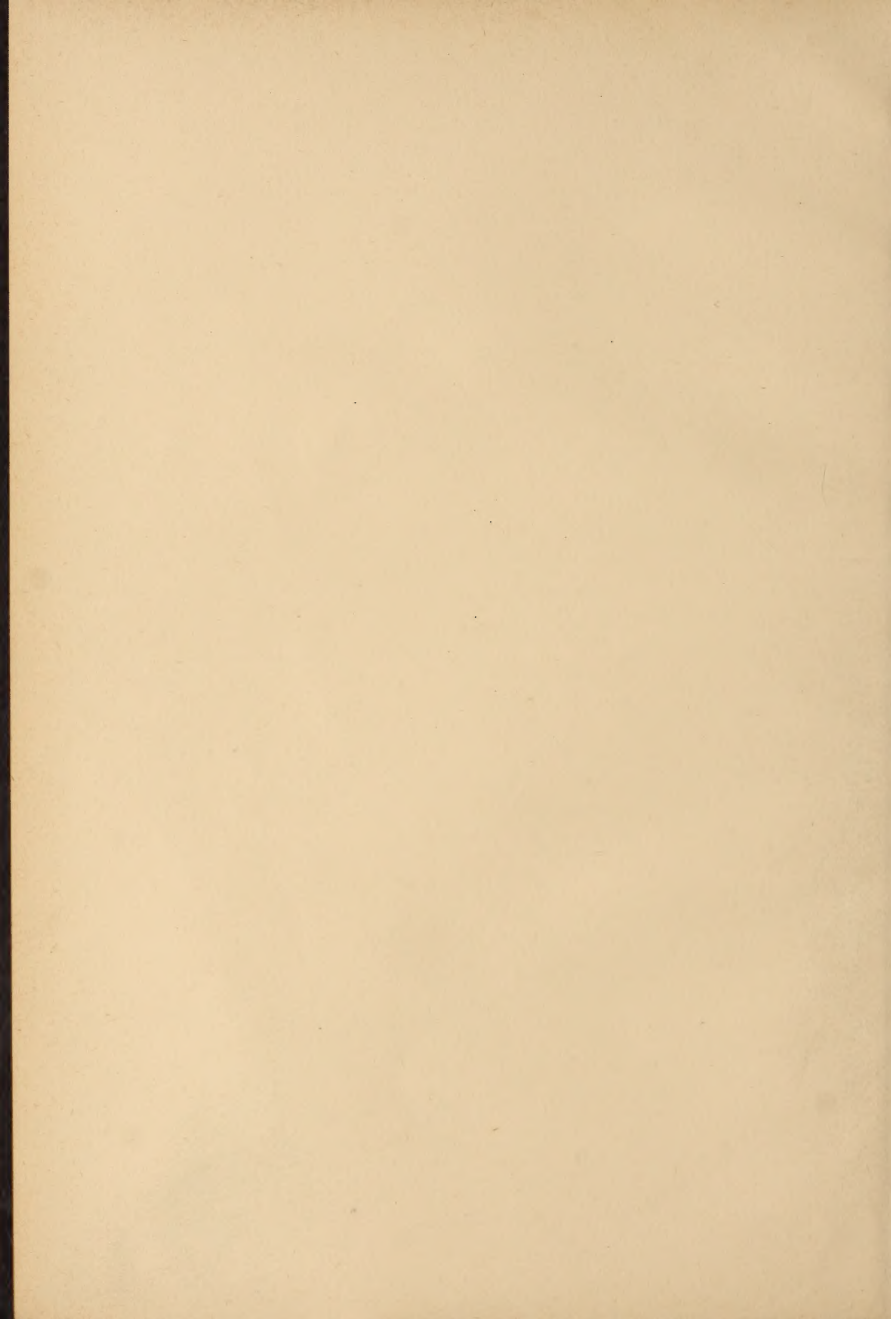
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EDITORIAL.

ANNOUNCEMENT.

With this issue THE INTERSTATE MEDICAL JOURNAL enters upon a new era of service to the medical profession. This journal has been purchased by the organization responsible for *The Modern Hospital*, and its editorial policy will be guided by the physicians whose names appear on the title page and by others who will presently be added to the staff.

A lengthy history, with fulsome comment on the outstanding merits of the INTERSTATE in the past and frank acknowledgment of its shortcomings, might entertain a few readers for the moment, but it is obvious that the wiser course will be to confine this announcement to a brief consideration of plans for the future.

A new social order is casting its shadow across the path of that future; the medical profession is vitally concerned with the changes that are upon the threshold.

Shall the physicians in this country sit apathetically, as did their fellows in Great Britain, and permit without a challenge the enactment of laws with cynical indifference to the rights and liberties of the profession, and therefore, in the long run, inevitably prejudicial to the best interests of society? Shall they not rather go forward, in manly fashion, to meet the future and take their rightful part in the weaving of the new social fabric, with preventive medicine, health and right living as firm ground colors and with the interests of the profession safeguarded in the very warp?

The new INTERSTATE purposes to address itself to these problems and to afford the American medical profession a rallying point where their efforts may be concentrated for the development of a sound constructive policy.

There exist many questions of detail arising out of the changing conditions of medical practice, which, though related to the concomitant changes in society at large, fall for solution primarily within the competence of the medical profession. Examples of

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such are the problems of group-clinics, of flat medical fees in hospitals, and of dispensaries for paying patients. That the profession may be adequately informed of the issues and that it may be provided with an organ for the expression of its opinions thereon, the INTERSTATE will open its pages as a forum for the discussion of these problems. In this way the profession may be prepared for the exercise of its legitimate influence on the results to a degree proportionate to the vital interest it has in them and in a manner compatible with its own dignity.

Institutional medicine, or the practice of the profession in the hospital wards, has come to be highly specialized. The physician of today, conscious of the limitations of bedside diagnosis, realizing the aid that properly conducted hospital laboratories of all kinds can afford him, and recognizing the necessity of efficient dieting, of good nursing, and of proper hygiene to the due care of his patient, is no longer content to see the absolute authority and responsibility for efficiency in these matters vested in the hospital superintendent or in a board of lay trustees. He must, therefore, prepare himself in such a way that his advice will carry weight with the executives of the institution in matters of organization, technic, and management. It is to be one of the most attractive functions of the new INTERSTATE to study and discuss these problems and to help translate the conclusions into standards of practice.

Incidentally the policies of the INTERSTATE in regard to advertising are to undergo considerable change. Beginning with this issue, the highest ethical standards are to prevail, standards that shall have the approval of the most critical censors in the profession. The adoption of these standards and their rigorous enforcement are merely the extension to the INTERSTATE of policies that have set *The Modern Hospital* on so high and serviceable a plane.

As heretofore, there will be special numbers of the INTERSTATE devoted, in symposium form, to topics of unusual interest. These symposiums have, in the past, been among the most welcome features that the INTERSTATE has offered to the profession.

The "Collective Abstracts," painstakingly and thoughtfully prepared as they always have been, with a view to permanent service, by specialists in the various departments, are to be continued and even amplified.

In order that some of the plans for the new INTERSTATE may be initiated at once and under favorable auspices, we have chosen for editor-in-chief a man experienced in State Medicine and acquainted with public affairs. Dr. Harold O. Nolan comes to us from the editorial staff of *The Journal of the American Medical Association*. He is a graduate of the London University in Medicine, in Public Health, and in Law. After a few years at the Lister Institute he entered the service of the Egyptian Government, where

he served for twelve years as Medico-legal Expert and, subsequently, for more than three years in a high administrative post.

Dr. Nolan brings to the new INTERSTATE literary and scientific attainments of the first order and a ripe and invaluable experience in the every-day affairs of men. He has been highly appreciated by those with whom he was brought in contact in the past, and, now that he has cast his lot with and predicated his career in this country upon the new INTERSTATE, we venture, before he has actually assumed his new duties, thus to bespeak for him the support and loyalty and confidence of our friends, knowing full well that time and more intimate acquaintance will justify these on his own account.

THE PUBLISHERS.

FULL TIME CLINICAL INSTRUCTION.

In every problem of reform, indeed in almost every type of propaganda, there are two questions of interest—namely, how did the new movement start, and what was the particular method adopted to furnish it with driving force? It is, of course, not always a simple matter to practice satisfactory analysis, particularly in some of the social-politico-economic reforms of the past, which have demanded for their thorough understanding both the clarifying influence of time and perspective, and the keen insight of the trained historian. Those problems originating in our own day and time appear simpler by virtue of their propinquity. Every man of the street, if he has not his own solution, at least has very definite notions about the origin of and proper solution for present-day questions. Truly, this unconscious individual sense of mastery of the problem plays no small part in the final solution; it is the first step in that process termed “the crystallizing of public opinion.”

But there are problems of importance in the solution of which the man of the street does not share. Reforms of real significance are often born and matured with the participation of only a small minority of those vitally affected by the outcome. This type of propaganda—we might almost call it silent reform—is interesting in general, but particularly so when confronted in our own limited field of medicine.

An instance in point is the agitation for “full time” instruction in the clinical branches of medicine. The genesis of this particular reform, as it happens, is not far to seek. The art of teaching is a rigorous, highly intellectual, time-consuming discipline. Two wholly extraneous elements, one of them purely human—muscular and mental fatigue—and the other purely physical—only a given number of hours between suns—renders it impossible for the average individual to serve adequately in the dual capacity of teacher

and practitioner. The *cognoscenti*, moved by these facts, and somewhat more deeply moved by the inadequate type of clinical teaching in America, decided that the Gordian knot must be cut by divorcing teaching from outside practice.

And now comes the point of interest. The driving force back of the movement has not been in the form of an appeal to the profession at large. There has been no clamor for public approval. Polemical discussion, in quantity just about sufficient to place evidence on record and to state the fundamental points at issue, has been followed by the introduction of the principle in two of our best medical schools. Firm advocates of the reform have cautiously hedged the tryout with the admission that it is, in a sense, experimental.

All of the rest of us await the result with keen anticipation. There seems to be scant room for doubt that clinical medicine differs in no fundamental way from any other branch of pedagogy; and this fortifies the prophecy that in a not uncommonly long period of time we shall see the vocational clinical teacher displacing the present-day avocational teaching clinician. When this time has arrived, we shall, with little difficulty, be able to determine exactly how much the student has gained or lost in addition to the more intensive clinical instruction received by him; whether his clinical mental grasp is broader; whether the human side of his medical ego has been cramped; and finally we shall be able even to decide whether excellent clinical pedagogues are using their teaching positions merely as stabilizing bases from which they hope to sail into remunerative practice.

THE CLOSED HOSPITAL.

The medical profession has always enjoyed the unenviable distinction of presenting a divided front, thereby demonstrating the disintegrating force of individualism. Doctors are truly a trying lot when it comes to fusing their activities, and about the best that can be said in defense of their seeming lack of community of interest is that they are usually found most wanting in supporting those movements which are concerned with their own uplift. Of late, however, there has been a change of tendency. The rather active process of socialization of medicine which characterized so much of the legislation of England and Germany before the war, and which threatened to become a predominant note in American legislatures, is tending to bring the doctors into focus. They have begun to look after their own so-called interests in a fashion not totally different from the manner in which groups of other workers have always guarded their privileges. Such a tendency is, of course, salutary.

There is the hidden danger, however, that, in clamoring for its own, the so-called organized profession may set itself to tilting at windmills. This seems to be about what has happened in regard to the closed hospital idea, which has been vigorously attacked by various medical societies in different sections of the United States.

The term "closed hospital" refers to a hospital in which all the work of medical organization and activity is performed by a limited number of men, selected to fill their respective positions by virtue of their special fitness. A group system of this sort is, in every sense of the word, typical of the very best scheme of organization in every other field of corporate or industrial activity. It postulates no inherent superiority in mental equipment or medical capacity of the special group of men who comprise the closed hospital staff, other than that their special qualifications have been investigated and found to be satisfactory. The methods of this group of men may be at variance with those of individual nonstaff physicians, but not necessarily better. The important point is that these men enjoy the rare privilege of being able to standardize their methods so as to render unqualifiedly better service to patients, and to young physicians and nurses in training, than could possibly be rendered by an equally competent but heterogenous and ever-changing set of physicians.

If one admits the inherent superiority of this type of united effort—and no one has yet effectually denied it—how is it possible for any protest? The answer is not far to seek, and rests on the fact physicians are, in a measure, losing sight of the truth that, from time out of mind, their calling has been held holy by virtue of the fact that it typifies service. Material as is this day and age, there is something not totally pleasing in a protest which ignores this ethical ideal. A hospital primarily represents the community's interest in the sick; the profession should look to it very sharply before entering a plea of interference with their material interests. They must not be unmindful of the fact that in those centers of medical activity where hospital organization has evolved slowly to its highest efficiency, it is the closed hospital that stands as the representative and dominant idea of hospital service.

Nor, on the other hand, should the closed hospital staff be unmindful of its trust. Abuse of trust and privilege on the part of staff members is, unfortunately, too common; more than that, it is probably responsible for much of the hue and cry that is being raised against the closed hospital. But granting this, we must not lose sight of the fact that the way to apply the proper corrective lies in pointing out a failure to render service, rather than in emphasizing the material loss sustained by worthy colleagues.

WAR SURGERY.

In the present issue we publish a note by Dr. Warbasse in which he discusses, or, it would be more just to say, answers in the negative the question, "Is There a Military Surgery?" The personality of Dr. Warbasse lends weight to his views, and, though they are somewhat emphatically expressed, so far as they constitute a protest against militarism, he will probably carry a majority of our readers with him. But there are two other questions involved. First, Dr. Warbasse seems to be of opinion that surgery at the front can be practiced without the surgeon being amenable to the rules of military discipline, and without being himself vested with its authority. Second, Dr. Warbasse lays down, in effect, that no special experience is necessary to fit a man to deal with the problems of war surgery. Dr. Warbasse's views on these points are, in the main, those with which surgeons entered on their work at the outbreak of the present war. Many of them, however, have found their opinions profoundly modified by actual experience. We therefore welcome this opportunity of inviting from surgeons with actual war experience a discussion of the questions raised, and we intend to publish, in an early number, a collective abstract on the surgery of war wounds. One of the statements in Dr. Warbasse's article, which we expect to see challenged, is that in which he says that gunshot wounds are obsolete. Some of the most troublesome wounds with which the present-day war surgeon has to deal are caused by shrapnel. Here we have a lead bullet, traveling with low velocity, and having therefore low penetration, spherical in shape and large in diameter, and therefore exhibiting a tendency to contuse and lacerate the tissues and to carry into them invariably infected fragments of clothing. Such a projectile produces the classic type of old-fashioned gunshot wound.

Among the circumstances which have been held to establish a difference between the surgery of war time and that of peace, some of the most important are the conditions, moral and physical, of the combatants who have, more often than not, stayed for days and often weeks in the worst possible surroundings, hygienic and otherwise, in circumstances of unexampled psychical strain, and who receive their wounds when they are in a condition of the utmost exhaustion and fatigue. Again, the nature and condition of the clothing of the wounded, the highly infected state of the soil, the depth and irregularity of many of the wounds, the length of time which usually elapses between the infliction of the wound and the commencement of treatment, time passed usually in most unfavorable conditions, and, last, the intense congestion in the dressing stations, all contribute to complicate the surgical problem.

It is evidently true that, were all these conditions, including the

stress on the surgeon, to be found united in one case in peace time, the indications for treatment would not differ from those which prevail in war; but what distinguishes war surgery from the surgery of peace time is that these conditions are almost universal in the former, whereas they can scarcely ever exist together in civil practice. Now, ultimately, whether we are conscious of it or not, all of our conduct, including our surgical conduct, is based on statistics. We call it experience. When Dr. Warbasse says that "the surgeon who is most competent to heal the wounds of peaceful men is most competent to heal the wounds of men who, seeking to take other men's lives, have themselves become wounded," he appears to be stating a truism, but many would prefer to say that the surgeon who is most competent to heal the wounds of peaceful men is also the one who most rapidly becomes competent to treat the wounds of war time.

Never before has urgent surgery been practiced on so gigantic a scale, nor with such co-operation of all the forces of laboratory science, of finance, and of administration behind it. When these things get into proper perspective, we shall probably find that, in the few years of war, urgent surgery will have made more progress than in the previous half century, and that the surgeons who have not been through the mill will find themselves in the position of learners at the knees of those army surgeons who, like their illustrious predecessor, Ambroise Paré, have been the makers of a surgical era. Then it will be time to say that there is no military surgery, but only because the surgery of peace will have adopted this new surgery, foster-child of horrid Bellona.

H. O. N.

PSYCHO-ANALYSIS.

The average layman—and in the term layman we here include all doctors except the neurologists—has a very limited right to express judgment on the philosophy or the therapeutics of psycho-analysis. If he felt that he had the right, he would probably suffer grave qualms of doubt after reading the polemical dispute now raging between those two high exponents of the doctrine of psycho-analytic investigation, Freud and Jung. But anyone has a distinct right to voice his sentiment regarding Dr. Sigmund Freud's recent psycho-analysis of Leonardo da Vinci. This sentiment need not necessarily concern itself with the sex impulse, which largely underlies the Freudian doctrine, nor even with the more questionable frustrated incest motive. These are topics that all of us realize are, in spite of grave complexities, subject to the same kind of analysis, in the mind of the psychologist, as are the amino acids in the laboratory of the chemist. But even so, one almost shudders

at the sense of nastiness that develops along with Freud's attempt to crowd sex and libido and incest into the years of a man whose life was admittedly largely nonsexual. Of course, one realizes that even these primal perversions are robbed of all obscenity when studied in the cold light of science; but this realization is lost sight of totally in the flamboyant appeal of the volume to the indiscriminate reading public. Possibly this fault should not be charged up against either Freud or his translator, Dr. Brill, but rather against the publishers, who have compounded their offense by printing on the cover of the book, in flagrant red type, the sentence, "This book is addressed exclusively to physicians and serious students of psycho-analysis." One feels instinctively that this sort of exploitation savors of the old-time museums of anatomy, formerly so common, whose rubric was, "For Men Only."

PREPAREDNESS.

With the talk of peace in the air and on every tongue, one hears with scant equanimity a strong countercurrent of talk on preparedness. Some of this preparedness doctrine is planned in martial spirit to meet the next clash of arms, some of it in the spirit of maintaining peace by a display of the old spirit of "but by Jingo if we do," some of it arranges to safeguard industrial supremacy, and some of it pleads for a generalized holy spirit of preparedness to accept a new doctrine of internationalism distilled out of the alembic of the bloody conflict.

But there is a highly specialized brand of preparedness, of which no mention is made, and which is strictly applicable to us as medical men—the preparedness to resume our reading. Before the war the *Centralblätter*, *Archives*, *Zeitschriften*, *Revue*s, *Vratches*, *Beiträge*, and *Grenzgebiete* cluttered the work table as a veritable ogre pile, demanding attention in a subtly obtrusive and insistent way that spelled "duty," and did much to remove both the joy and leisure of life. Gradually, as war progressed, our foreign journalistic visitors grew smaller in bulk, then smaller in number, and finally so insignificant in content as to be reasonably negligible.

With the declaration of peace, not only will the sword be forged into the plowshare, but also will there be a renaissance of the old-time medical logorrhea. We have lulled ourselves into a spirit of *dolce far niente*; we are out of the rut by no fault of our own; there has been no chiding voice of duty. But the ides of March approach. Be prepared!

ORIGINAL ARTICLES.

THE ADVANCEMENT OF THE ILEOCOLIC SPHINCTER
IN SURGICAL CONSTIPATION.¹

BY W. HOWARD BARBER, M. D., New York.

The "ileocecal valve" has recently come into surgical prominence in the effort to arrive at an effectual method of securing relief for certain difficult cases of constipation. Ranking in importance with the uretero vesical and the bilioduodenal "valves," its structure, physiology, and vital nervous connections with the other parts of the alimentary tract emphasize the wisdom of preserving the organ whenever it is possible to do so.

STRUCTURE.

The ileac sphincter resembles the biliary and the ureteral sphincters (Fig. 1) in the obliquity of the anastomosis (Fig. 2) and in the relative preponderance of the circular muscular fibers in the immediate proximity of important nodal tissue (Fig. 3). The value of the "oblique union" of the ureter with the bladder has been brought out in a previous study on ureteroenteric anastomosis, in which it appeared that any surgical junction of the ureter with the large bowel, to be successful, must approach 1.5 to 2 cm. in length. Coffey, working on the oblique arrangement of the bile duct with the duodenum, came to a similar realization of the value of obliquely joining the ureter with the intestine. In the case of the ureter, too, it has been shown that its continual prostatic drive is the surest bulwark against ascending infection, but in those instances in which the neuromuscular mechanism is impaired the "valve" remains as a second means of preventing disease higher up. Further analogies have been shown to exist between the ureter and the small bowel in respect to the coordination of the two ends of each when the distal ends of either become partially or completely obstructed. From these and other considerations it appears that there is an especial wisdom in the preservation of the integrity of the "valve" at the end of the small intestine.

Although the ileum typically meets the ascending colon from the left side, variations occasionally occur. Rarely the small gut ap-

¹From the Laboratory of Experimental Surgery, New York University and Bellevue Hospital Medical College, and from the Department of Gastro-intestinal Surgery, Polyclinic Medical School and Hospital. Presented for publication December 15, 1916.

proaches the anterior surface of the large bowel; recently an instance in which the ilium effected a right-sided anastomosis presented itself. Anterior and lateral anastomoses are probably acquired through rotation of the ascending colon on its longitudinal axis, as was clearly manifested in the tense inflammatory parietocolic membrane of the case above alluded to.

The anatomy of the "valve" is beyond imitation. Like the invagination of the ureter into the urinary bladder, the ileum is only partially inverted into the colon, for the mucus, submucus and longitudinal muscular coats appear in the sphincter and the longitudinal musculature and serous layers remain outside. This arrangement may be maintained in part by the stretched-out longitudinal muscle and in part by the restraining frenula of the segments of the valve on the interior of the cecocolon. The segments or the pouting lips of the extreme end of the ilium are two in number, an upper or horizontal and a lower or oblique one. The patency of the "valve" varies with the condition of the individual—if anesthetized, on the extent of the narcosis. Usually one finger's tip to two fingers can with moderate pressure be inserted into the opening.

PHYSIOLOGY AND NERVOUS CONNECTIONS.

The function of the ileocolic sphincter is not definitely established. It is held that the "valve" regulates the ileac effluent into the colon, or that the sphincter prevents regurgitation of colonic contents from the cecum into the ileum, or that it is adapted to accomplish both of these processes. Certain it is that, with moderate pressure, perhaps 30 percent of enemata pass into the terminal small gut; with increased force of injection, this percentage of regurgitation increases. Based on these findings, the working hypothesis of "insufficiency of the ileocecal valve" has arisen, and on it much supposedly corrective operative work upon the sphincter has been performed. Serial microscopical studies by A. Keith,¹ of London, have revealed nodal tissue in the anterior and posterior portions of the cecal collar about the termination of the ileum, similar to that about the end of the bile duct in the duodenum and to the thickened neuromuscular meshwork described by Bardeleben,² to exist about the vesical end of the ureter. The presence of this nervous tissue, which is no doubt to be regarded as a specialization of the myenteric plexus of Auerbach in the immediate proximity of the "valve," establishes for it an important nodal relay in the alimentary tract second only in importance (if any) to the center in the descending portion of the duodenum.

The experimental effects produced by separating this proximal colonic center from the cephalad portions of the alimentary tract are well shown in the dilatation of the duodenum following incom-

plete obstruction of the end-ileum. Mutch,³ of London, corroborates these findings clinically. Several of our own human cases have shown increased duodenal shadows and have been found at operation to be abnormally "held down" in the ileocecal regions. Case reports comparatively few "ileocecal cases" with recognizable duodenal changes. X-ray studies from the Mayo Clinic⁵ have not yet come to associate other than intrinsic duodenal causes with dilatation of the duodenum. Fortunately, Alvarez,⁶ working with intestinal segments, has again revealed an absolute interdependence



Fig. 1.—Diagram illustrating removal of terminal ileum, "ileocecal valve," and ascending colon. This is called hemicolectomy, or by Lynch-and-Draper "reconstruction."

of the upper end of the small gut upon the lower end as far as its intestinal tone is concerned. The important regulatory influence of the proximal colonic center is well shown in dogs after resection of part of the oral colon, with terminal union of the divided ends and with preservation of the ileocolonic sphincter. Similarly human ileostomy cases, as Lynch and MacFarland⁷ maintained, do reveal inhibitory control in the reduction of and in the solidification of the contents discharged from the ileac stoma. These observations serve to indicate the significance of the iliocæcum as an important tone-relay center. It is unnecessary to refer to the rich lymphatic

connections of the end-ileum which establish it as a vital absorptive medium. Functionally, this junction of the small and the large bowel appears almost indispensable for the welfare of the individual.

SURGICAL CONSTIPATION.

Surgical constipation implies any obstruction, dynamic or adynamic, of the terminal small or of the large intestine in which surgical intervention is indicated. Due to Lane's enthusiasm, interest is particularly manifested of late years in the obscure adynamic obstruction of the colon. As a result, two schools have arisen—

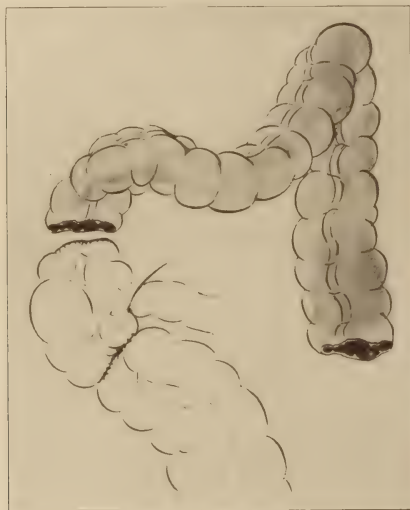


Fig. 2.—Diagram illustrating Lardennols' method of subcecal colectomy. Note portion of large intestine preserved (cecum) and portion removed.

the mechanists, championed by Lane, who ascribe all "stasis" to obstructing bands or kinks, and the laboratory clinicians, represented by Keith, Alvarez, and our own laboratory, who are emphasizing the physiological impairment of the neuromusculature in these difficult intestinal cases. This latter hypothesis is in accordance with what has been said above concerning the "ileocecal valve," explains many of the ill results when the "valve" has been sacrificed, and accounts for the pathological findings in many of the colons resected.

OPERATIVE TREATMENT.

Operations of intestinal resection involving the ileocecum may be divided into three classes as follows:

1. Colectomy, partial or complete, including the sphincter.
2. Colectomy, partial or complete, with the preservation of the ileum, sphincter, and cecum.
3. Colectomy, partial or complete, with the preservation of the ileum and the sphincter only (advancement of the ileocolic sphincter).

In the first group the anastomoses may be terminal, termino-



Fig. 3.—Diagram illustrating author's method of advancement of "ileocecal valve," with preservation of terminal ileum and sphincter and removal of cecocolon.

lateral, or lateral, and isoperistaltic or heteroperistaltic. In the latter two groups the anastomoses are of the end-to-end variety. All these unions may be without, in, or within the plane of peritoneal closure. As in gastrointestinal, so it appears in enterocolonic anastomoses that the union which leaves the parts united in the most normal relation with each other is to be preferred. For this reason the segmental resection with terminal union is to be chosen. The disposition of the sutured ends depends on circumstances. Often it appears prudent to leave them loosely attached to the peritoneum behind the wound; occasionally it seems wise to close

the peritoneum about the anastomosis (as in the author's method of enteroureteral anastomosis); but the important point is to leave the operated field accessible in the event that necessity arises to secure relief from gas or from leakage.

The above operative procedures are illustrated in the accompanying illustrations. Fig. 1 represents the method in common practice. It is open to the criticism that it removes more tissue than that directly diseased, including the sphincter. In the after-result it is absolutely impossible to determine in any particular case what results, good or bad, are properly ascribable to the removal of the

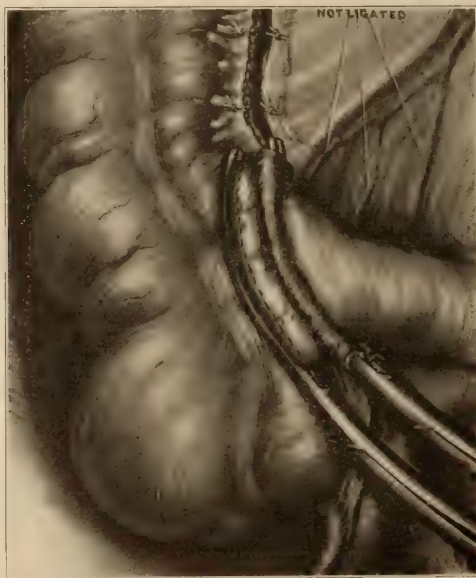


Fig. 4.—Step in advancement of "ileocecal valve," illustrating method of placing clamps, the line of incision distal to the "valve," and the preservation of the ileocolic vessels intact until after resection is completed.

ileum, the "valve," or the more pathological ceco-colon. Fig. 2 depicts the Lardennois method, little known in this country. This operation conserves more normal tissue than the preceding and at the same time some of the supposedly most diseased colon—the cecum. Fig. 3 has been originated by the author to dispose of the objectionable points of both of the above—namely, to conserve the

good tissue, including the sphincter, and dispose of the bad. The "valve" may be *advanced* to any level along the colon, and the collar may be trimmed to fit the cut end of the distal colon.

TECHNIC OF ADVANCEMENT OPERATION.

An incision of ample working size is made through the right rectus. The abdomen is gently explored. Special attention is given the alimentary tract as a unit, bearing in mind what slight disorder



Fig. 5.—One of a series of x-ray pictures taken by Dr. L. T. LeWald, illustrating complete clearance of the small intestine and site of sphincter six weeks after a canine advancement operation.

in one part may upset the balance of other parts of the stomach and intestine. In removing the right colon, the portion to be removed—the cecum, ascending and perhaps the omentum-free end of the transverse colon—is gently drawn out and separated from the remaining abdomen with gauze. Commencing from the lower right side, the peritoneum is divided as closely to the line of colonic reflection as possible. Starting from above and mesially, the same

separation of peritoneum is continued down to the ileocecal vessels. The vessels above the ileocecal vessels are next ligated and divided. The colon is incised between clamps below, as illustrated, and at the plane determined on above. *The ends of the iliocecal vessels are caught and ligated only as they appear in the cecal collar.* Separation of the resected portion is then completed. There should be no difficulty in bringing the divided ends together and suturing. It is important to close the raw surface exposed by the removal of the colon, which is accomplished by suturing the cut edges of peritoneum together over it. Any interval that may be left between the mesocolon and the edge of the mesentery is closed.

CASES OPERATED ON.

The animals experimented on (in all four cases successfully) have had two to three movements daily the first week and by the end of one month; two performed evacuations a day. The change in their nutrition is about what exists in animals confined within doors.

The following human case gives a corresponding postoperative history: J. P., woman, age 30, married; Italian. Complained of continuous abdominal pain, tenesmus, and the passage of watery mucus twice daily. She retains barium ninety-six hours after meal and shows an enormously dilated ascending colon and hepatic flexure. She had had two previous abdominal operations: one, two years ago, a sigmoidectomy; both without relief. Examinations of blood and urine negative. Her weight is 89½ pounds, dressed. Operation was carried out as above described. At the present time, one month after the removal of the right colon, she is having two soft movements a day, and to date has been free from her abdominal pain.

The author acknowledges the constructive criticism of Professor G. D. Stewart, of the Department of Surgery, and of Professor H. D. Senior, of the Department of Anatomy in the preparation of this paper.

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BLOOD-PRESSURE AS A GUIDE DURING MAJOR OPERATIONS.¹

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It is a well-recognized surgical principle that whatever measures may be taken to safeguard the patient before, during, and after operation, should be taken. In a previous communication¹ we have pointed out the necessity for most careful study of our patients' vitality and physical idiosyncrasies before bringing them to the table, as well as the need of painstaking watchfulness throughout their convalescence. But while these measures are most highly desirable, and to neglect them is inexcusable, we should go still further, especially in capital surgical procedures, and keep ourselves informed throughout the operation as to the exact condition of the patient. Such information it is perfectly easy to obtain through frequent readings of the blood-pressure. These may be taken by the etherizer without in any way interfering with his other work, and the intelligence which he from time to time imparts is of great value to the operator. When all is going well, it is a distinct comfort to know it, and, on the contrary, if the patient's condition begins to decline, the operator is forewarned of impending disaster, and may take proper steps to combat it.

With a view to determining the value of blood-pressure as an index during operations, we have studied a series of 50 cases, deliberately selecting operations of the distinctly major type, with enough simple ones to act as controls. The extensive pelvic dissections incidental to the radical Wertheim operation for cancer of the uterus, and the trying operations in and about the mouth and neck for the same disease as performed by Dr. Farrar Cobb at the Massachusetts General Hospital, offered unusual and extreme opportunity for our study. Such operations, of course, place a tremendous tax on a patient's vital forces, and whatever changes may take place in major work are most likely to appear in this class of cases.

Plan of Study.—For comparison with each patient's pressure during operation, we noted his pressure at the time of entrance to the hospital, taken as a matter of routine in the physical examination. With this as a starting point, the procedure was as follows: The systolic pressure and the pulse rate were noted when the patient reached the etherizing room and before anesthesia was started, again at the time it was started, and at least once every five

¹Read before the surgical staff of the Massachusetts General Hospital.

minutes throughout the operation. In many instances, or whenever there was taking place an obvious change in the readings, we recorded that change as often as once in two or three minutes. In addition, there was noted the time the operation was started, any change in the patient's position on the table, any specific steps, such as ligation of important vessels, anything likely to produce sudden reaction, or any event of special interest.

A Tykos sphygmotonometer was employed, and in the abdominal operations the patient's arm was carried above the head; in operations about the head and neck, where the arm lay at the side, the length of the tubing running from the cuff was increased by using

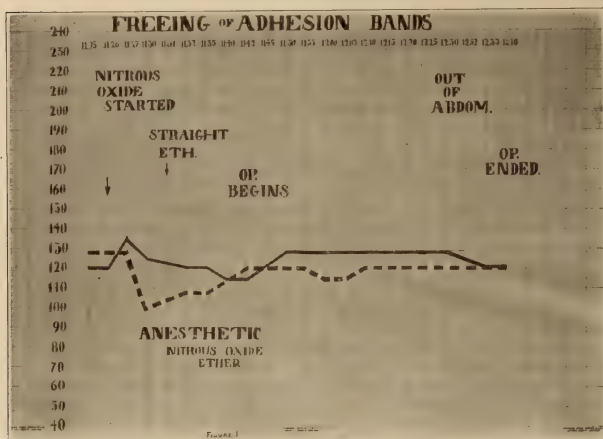


Chart I.¹—Note initial rise of blood-pressure almost synchronous with beginning of nitrous oxide, which soon fell again to the "individual level," remaining there throughout the operation. This chart is characteristic of the controls.

glass connecting tubes between this tubing and other pieces of similar diameter about a foot long. In this way it was easy to get the pressure at all times without interfering with the operator.

In making these observations there are several opportunities for error, which must be guarded against. First, it is essential that the measurement be taken at the same level as the heart, for if made at a point lower than the heart we obtain not only the blood-pressure, but the weight of the column of blood representing the difference between the level of the heart and the level of the observation, and, bearing in mind that a column of blood 10 cm. high gives a reading

¹Solid lines represent systolic pressure; broken lines, pulse rate.

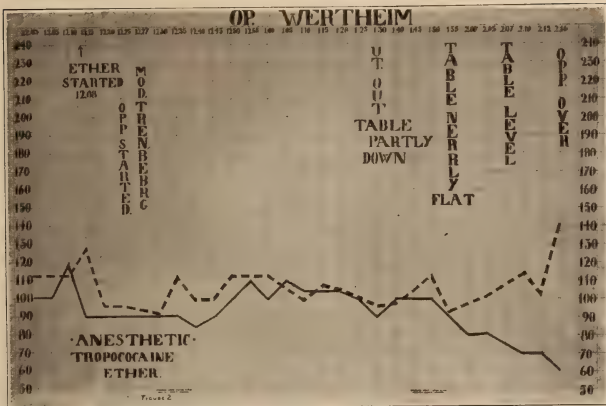


Chart II.—Illustrating the drop in pressure to a point below the "individual level" after the initial anesthetic rise. This phenomenon, followed by the rebound to the patient's level, is nearly constant.

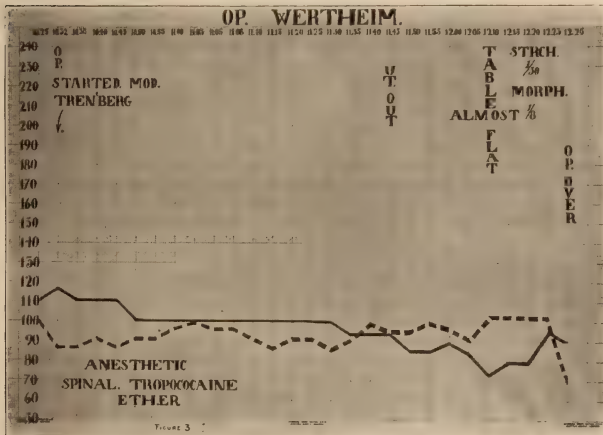


Chart III.—In this case, at 11:30 a. m., an hour after the operation had been started, there began a gradual fall of pressure, indicative of failure. The alteration was unaccompanied by appreciable change in the pulse rate. The upward rise at 12:10 p. m. was in all probability due to the fact that no more traumatizing work was going on in the pelvis.

trous oxide anesthesia, and it appeared also in four cases anesthetized by rectal anesthesia. The rise is due, undoubtedly, to the sudden introduction into the blood of a foreign gas, which instantly

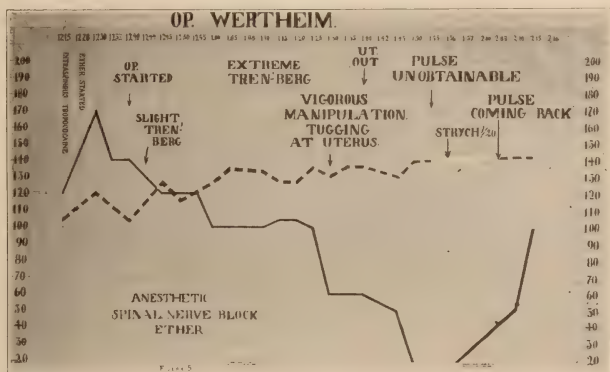


Chart V.—Typical chart of shock, in which the fall in pressure and rise in rate were practically simultaneous. The sudden drop at 1:30 p. m. is illustrative of what manipulation of the pelvic and abdominal organs may produce in pressure changes.

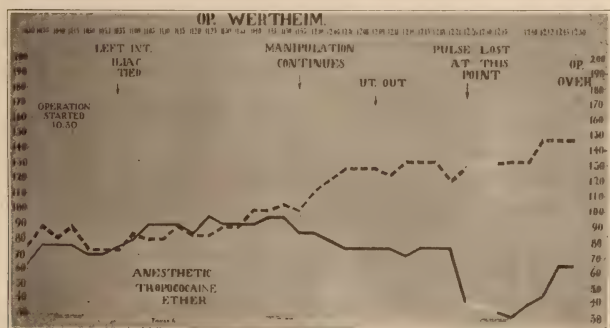


Chart VI.—Characteristic shock chart. An initial fall, as illustrated here, following the intraspinal injection of tropacocaine, was not uncommon. During the first hour the pressure rose from a low point at the start to a higher level. From 11:30 to 11:50 a. m. the operator was freeing the parametrium from pelvic walls, the procedure requiring a good deal of manipulation. This undoubtedly was what induced the shock. This patient responded very quickly to stimulation after being put to bed.

acts upon the vasomotor center in the medulla, raising the pressure. The "individual level," after being reached, is maintained rather closely throughout anesthesia, barring changes due to oncoming

shock, asphyxia, sudden cerebral anemia, or changes in the patient's position on the table. Certain other factors, such as struggling, depth of anesthesia, and manipulation of organs, also influence the pressure, but to a less degree. (Charts I, II.)

Shock.—In several cases of shock of varying degree, there was, as a rule, a gradual fall in the pressure, as shown by the readings, starting from twenty to thirty minutes before there appeared an appreciable rise in the pulse rate. This fall was too slight to detect without a recording apparatus, but was gradual in the succeeding readings, showing a progressive fall of from 5 to 10 degrees. This made it possible to notify the operator of the patient's failing condition a considerable time before there was noticeable change

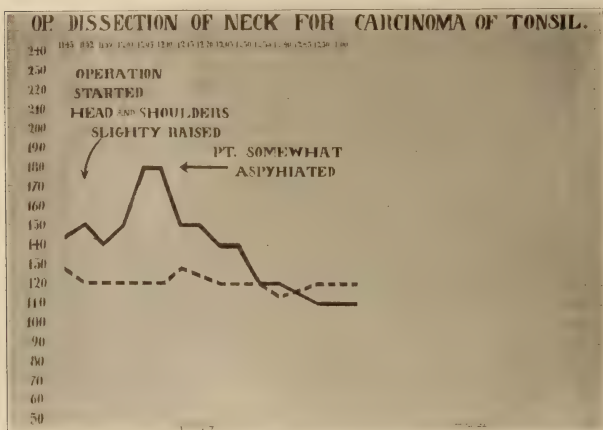


Chart VII.—At 12:00 m. the first upward rise was noted. During the next five minutes it went from 150 to 180. At this point the interference with respiration was eliminated and the pressure immediately dropped. The continued fall was probably a forerunner of shock.

in the quality or rate of the pulse, signs on which it is ordinarily the custom to depend for warning of imminent failure or shock; and by acting early in these cases, conditions which easily might have become serious were rendered harmless. The rule that the pressure falls first does not, however, invariably hold true, for in some instances the beginning drop in pressure and the rise in pulse rate were virtually simultaneous. (Charts III, IV, V, VI.)

Asphyxia.—Janeway has pointed out that in first-stage asphyxia, during which the respiratory center is stimulated and the breathing is rapid and deep, the vasomotor center in the medulla is also thrown into action, and a marked rise in the blood-pressure occurs.

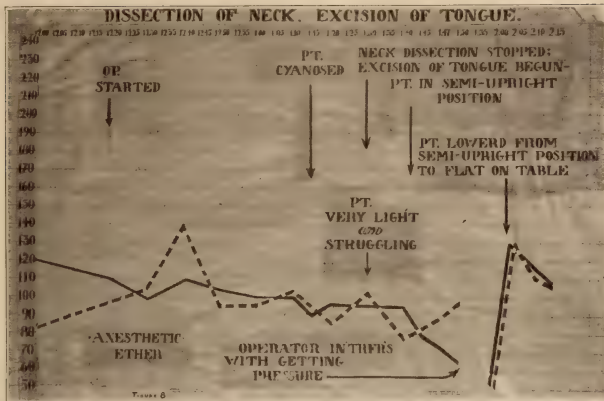


Chart VIII.—Phenomenon of cerebral anemia. Note the instant drop in pressure at 1:40 p. m. when patient was put in semiupright position; also the continued and rapid fall in both pressure and pulse until table was again in a horizontal plane. Then observe the instant rebound to point above the "individual level" and immediate subsidence toward subanesthetic line.

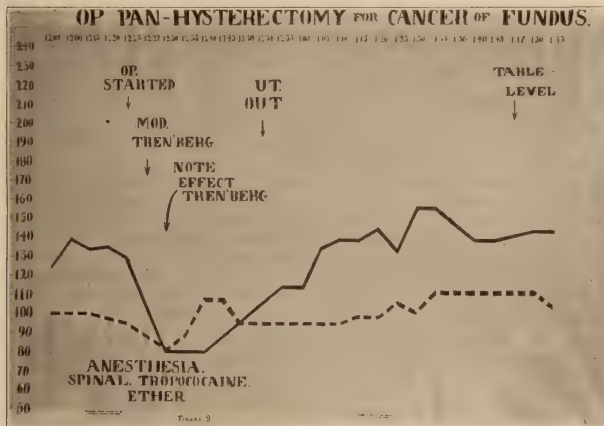


Chart IX.—Effect of Trendelenburg position (see also Charts II, IV, V, X. Chart II illustrates that occasionally there may be no change whatever). In all these cases of Trendelenburg position it is not unlikely that the fall may have been due to manipulation of the pelvic viscera, or possibly to the gravitation of the tropacocaine to the higher nerve centers.

This is also seen in slighter grades of deficient oxygenation of the blood. Janeway applies this observation more especially to the study of cardiac and lung conditions and to laryngeal diphtheria.³

This phenomenon occurred in two cases of the series, both in operations about the face. In each instance it was possible to warn the operator, even before there had taken place the usual darkening of the blood, that the patient was getting an insufficient supply of air. As the difficulty in these cases is usually due to the operative procedures, rather than to the anesthetic, the warning to the surgeon is of real value. Chart VII vividly represents the pressure change which comes with interference in breathing.

Cerebral Anemia.—In cerebral anemia the pressure phenomenon

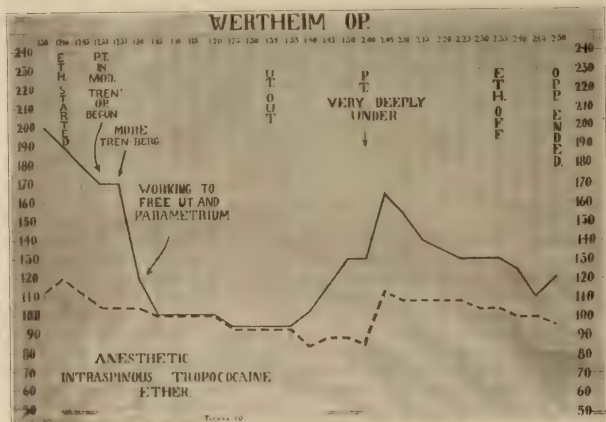


Chart X. Illustrates very graphically the combined effect of Trendelenburg position and manipulation of the pelvic organs. The latter was undoubtedly the principal factor in this instance, for the drop came almost immediately after the operator began his work in the pelvis. Observe the rise which appeared as soon as the uterus was removed.

is exactly the reverse of what is seen in asphyxia. In each of the three operations in which it was observed—all of them for cancer about the mouth—the patients were, at the time of the occurrence, in the reversed Trendelenburg position. The fall in pressure was invariably almost instant, very alarming, and accompanied by marked slowing of the pulse. Immediately on change of position to the level, or slight Trendelenburg, the pulse and pressure righted themselves with a bound, going at first to an excess of the rate they had maintained up to this time, then quickly subsiding to the normal subanesthetic point for the individual. (Chart VIII.)

Trendelenburg Position.—It has been said that the effect of the

Trendelenburg position is unfavorable to patients, and, with a view definitely to determine whether this was so, we carefully observed the result of placing individuals in this unnatural posture. In nearly every instance there was an almost immediate fall in pressure, to a greater or less degree, though, as a rule, the downward curve was not an alarming one, and the pressure soon returned to the "individual level." Nor did keeping patients in this position over considerable lengths of time apparently produce untoward results. (Charts IX, X.)

CONCLUSIONS.

The blood-pressure index is a valuable guide in major surgical work. It is of special value in operations likely to be of long duration, in which the element of shock is apt to appear; also in operations upon delicate women, weak men, or obviously poor risks. In great operations about the head or neck it is of very definite worth, frequently giving warning, as nothing else could, of approaching asphyxia or cerebral anemia. In the class of cases studied it adds to the operator's sense of security and to the patient's safety. We do not, however, advocate it as a routine measure.

We take this opportunity to thank Dr. Cobb for the privilege of studying his cases and the staff of the Massachusetts General Hospital for permission to report the results of the study.

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ROENTGEN INDICATIONS FOR SURGICAL PROCEDURE IN POSTPYLORIC ULCER.

By LEWIS GREGORY COLE, M. D., New York,
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As the title indicates, this communication is limited to a consideration of the roentgen indications for surgical procedure in postpyloric ulcer. The roentgen method of diagnosis of this lesion was considered in detail in an article read before the International Congress at London, 1913, and published in *Lancet*, May 2, 1914. As therein described and as employed by the author, the roentgen diagnosis is based on the identification, by means of serial radiography, of the pathological process—that is, the detection of the induration or the cicatricial contraction of the connective tissue, and of the crater of the ulcer as it distorts the lumen of the cap.

Some of the ulcers, when advanced or when accompanied by pyloric stenosis, may be detected in a short series of perhaps two or three plates, or even in a single plate, and some may be detected by fluoroscopic examination. The important point is that this diagnosis, contrary to the diagnosis as based on symptom complexes, is based on the visualization of the lesion, either from serial roentgenography, or from a single plate, or from fluoroscopic examination.

My own conclusions are that a higher degree of accuracy in diagnosis can be obtained by a series of thirty-eight or forty plates than can be arrived at from a few plates or from fluoroscopic examination. If, by this method of examination, one is to determine not only the presence of a gastric or postpyloric lesion, but also determine whether surgical procedure is indicated, it means that the roentgen method of diagnosis is to take the place of an exploratory operation, and it therefore rises to a degree of importance which demands a most thorough examination.

I consider that a thorough examination calls for a number of plates made in different directions and at different periods of time after the ingestion of the barium suspension. For instance, twelve plates made with the patient in the prone posture, six in the lateral or oblique direction, twelve more in the erect posture—all made within fifteen minutes after the ingestion of the barium; six plates made two hours later and two stereoscopic roentgenograms made six hours later, would in my opinion constitute a thorough examination, and the facts which I am about to state are based on such a method of examination.

In the minds of most surgeons and of many physicians the definite assurance of the *presence* of a postpyloric ulcer is sufficient indication for surgical procedure. This is evidenced by Moynihan in the opening lines of his chapter on the Treatment of Chronic Duodenal Ulcer, in which he says: "In my opinion the treatment of a chronic duodenal ulcer should always be surgical." Codman, in his original article, wishes for an eye that can detect "all the fish in the bottom of the pond," at least intimating that he would operate on any case in which he was sure duodenal ulcer was present.

This communication is based on a study of 1,000 gastrointestinal cases, from which we have made a diagnosis of postpyloric ulcer in 100 cases. In selecting these cases of postpyloric ulcer we have eliminated all other organic lesions—gastric cancer, gastric ulcer, pylorospasm, gall-stone, and, with a few exceptions, gall-bladder infection, duodenal-jejunal obstructions, and numerous other obscure organic lesions. Each of the hundred cases of postpyloric ulcer either has been operated upon or is similar, in every roentgen detail, to some case that has been operated upon and proved by surgical procedure to be present. In only two cases have the surgical findings failed to corroborate the roentgen diagnosis.

In considering the indications for surgical procedure, each case must be considered individually, or those which give similar roentgen findings may be grouped together and each of these groups considered separately from other groups.

The roentgen findings on which the diagnosis of postpyloric ulcer and the indications for surgical procedure are based are as follows:

1. Pyloric or postpyloric stenosis.
2. Deformed cap.
3. Obliterated cap.
4. Crater.
5. Compensating gastric peristalsis.
6. Failure of compensation.
7. Secondary gastric involvement.

In order that there may be a definite understanding of these terms, we will define as best we can what we intend to convey by them.

The definition of pyloric stenosis, according to Cattell, is as follows: "Fibrous contraction of the pylorus, thus narrowing the caliber of the orifice and leading to dilatation of the stomach and consequent retention of the food, with fermentative changes." In some instances the roentgenograms show the stenosis to be $\frac{1}{2}$ inch or $\frac{3}{4}$ inch beyond the pyloric valve; therefore the term "pyloric stenosis" or "postpyloric stenosis" is used.

The simple term, "deformed cap," is applied to that important and extensive group of postpyloric ulcers in which the induration and cicatricial contraction have *not* reduced the lumen of the cap to

such a degree as to cause stenosis, and where there is *no* bullethole crater or secondary gastric involvement.

An "obliterated cap" is a cap so altered in its morphology that it no longer functionates as a reservoir and is deformed beyond recognition. In considering the question of surgical procedure, it is absolutely essential that the cases of postpyloric ulcer with obliterated cap and failing peristaltic compensation, or with bullethole craters or with secondary gastric involvement, shall be differentiated from the simple deformed cap without obstruction.

The term "crater" or "bullethole crater" hardly needs defining. This condition is referred to by all observers as a small round punched-out area in the mucosa, submucosa, and muscularis. Into this punched out hole barium may enter and give a characteristic roentgen shadow.

"Compensating peristalsis." If one considers the action of the heart, and refers to the gastric cycle and the gastric systole and diastole as he would to the cardiac systole and diastole, it is very easy to carry the simile to the derangements of these organs, thus recognizing pyloric stenosis as similar to aortic stenosis. If the muscularis of the left ventricle hypertrophies and forces the blood through the aortic stenosis, one refers to such action of the heart as "cardiac compensation." If the musculature of the stomach hypertrophies and by hyperperistalsis forces the chyme through the stenosed pylorus, we have referred to it as a "compensating gastric peristalsis" or "gastric compensation."

"Secondary gastric involvement" is a term employed when cicatricial contractions or indurated areas have traversed the pyloric valve and involve the extreme pyloric end of the stomach.

Since by the method of serial roentgenography one is able to diagnose postpyloric ulcers in cases where the clinical evidence is not sufficiently characteristic to justify such a diagnosis—or at such an early stage that it could hardly be considered a chronic ulcer or the slight cicatricial contraction which results from a single attack—it would be manifestly unjust to apply to all these cases of early and slight lesions the indications for surgical procedure described by most surgeons, who, as Dr. Peck has suggested, do not usually see the cases until they have gone through several attacks and have failed to respond to medical treatment.

If the all-seeing eye which Codman wished for, that he might see all the fish in the pond, has been developed, it must also be used to discriminate between the big fish which are worthy of the angler's skill and the sunfish which nibble at the bait, but which never grow to any size.

Therefore it is evident that the method by which these small, slight lesions are recognized must also be used, in part at least, in determining whether surgical procedure is indicated.

In the study of these cases, those that are almost identical in every roentgenological detail will be grouped together, and the subsequent clinical history of the cases which have a gastroenterostomy will be compared with the subsequent clinical history of others in the same group which were treated medically.

Every attempt has been made to get a fair report, unbiased by enthusiasm of the surgeons, or, if the case was treated medically, unbiased by the hopes of the physician for a permanent cure. Many of these reports are based not on a single inquiry made one, three or six months after the operation, or the roentgen diagnosis, but on a series of inquiries following the subsequent history. In some instances the inquiries cover a period of six years. In several cases we received report after report that "the patient was cured by medical treatment," and yet eventually the patient came to an operation. In many others the medical treatment has so completely relieved the symptoms that, during the subsequent course of the disease, one could not possibly consider advising surgical treatment, and, if he did advise it for his own edification, the patient refused it.

In a study of this 100 cases of postpyloric ulcer, those that are nearly identical in every roentgenological detail will be grouped together, and the subsequent clinical histories of those cases which have had a gastroenterostomy will be compared with the clinical histories of the others in the same group which have been treated medically.

The hundred cases were divided into the following groups:

Postpyloric ulcer	With roentgen indications for surgical procedure	37 percent.	Group I.	Obliterated cap, with pyloric or postpyloric stenosis and failure of gastric compensation.
			8 percent	
			Group II.	Obliterated or deformed cap, with stenosis and failing gastric compensation.
			8 percent	
			Group III.	Deformed or obliterated cap, without stenosis, but with a deep crater with thick edges.
			4 percent	
	With roentgen indications for medical treatment	63 percent.	Group IV.	Obliterated or deformed cap, with secondary gastric involvement.
			5 percent	
			Group V.	Obliterated or deformed cap, with partial stenosis and compensating gastric peristalsis.
			12 percent	
			Group VI.	Simple deformity of the cap, with slight stenosis or without stenosis and with a normal or slightly active gastric peristalsis, which empties the stomach in six hours, and without a deep crater or secondary gastric involvement.
			63 percent	

The first group, consisting of 8 percent of the cases, deals with those cases in which the induration and cicatricial contraction have resulted in such a deformity or obliteration of the cap, with a marked degree of stenosis of the pylorus, that the compensating gastric peristalsis has failed to evacuate the stomach in six or even in ten or twelve hours. These are referred to as having "broken compensation."

In this group of cases it is evident that surgical relief is absolutely necessary, otherwise the patients die of inanition. Therefore we have no cases treated medically to compare with these eight cases which we will consider in this group.

Of the eight cases, only two will be used for illustrative purposes.



Fig. 1.—Illustrates group 1. Surgically treated.



Fig. 2.—Illustrates group 1. Surgically treated.

CASE I. (Fig. 1.)

Clinical history: Indigestion for five years. Nausea and vomiting after a large meal. No history of hemorrhage.

Roentgen diagnosis: Obstructive postpyloric ulcer.

Surgical findings: Obstructive ulcer found and palliative operation done.

Subsequent history: Marked gain in weight and disappearance of all symptoms. Patient reports that he is able to eat everything.

CASE II. (Fig. 2.)

Clinical history: Three years previously symptoms began and consisted of attacks of pain and vomiting at intervals of several days. Weight loss of 40 pounds. A history of two previous operations, one for appendicitis.

Roentgen diagnosis: Postpyloric stenosis, causing a large gastric dilatation. Diagnosis of an ulcer on the anterior surface of the cap, with adhesions.

Surgical findings: A mass involving the cap, pyloric valve and extreme

pyloric end of the stomach was found and removed. Microsection proved non-malignancy.

Subsequent history: Not obtained.

My conclusions from a study of this first group are that surgical procedure is definitely indicated in all these cases, and this was distinctly evidenced in the roentgen indications and substantiated by surgical procedure and by the subsequent history of the patient.

Group II consists of 8 percent of the cases, and these cases are identical with those in the group just considered, except that the stenosis is less and the compensating peristalsis has not failed, and the stomach is eventually evacuated. In other words, the cases of this group are similar to those of the first group, but not so advanced. We will refer to this group as having "failing gastric compensation."

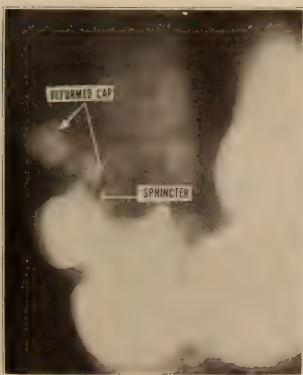


Fig. 3.—Illustrates group 2. Surgically treated.

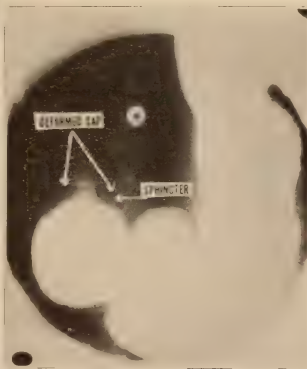


Fig. 4.—Illustrates group 2. Medically treated.

CASE III. (Fig. 3.)

Clinical history: Indigestion for years, more acute during the last year, accompanied by pain after eating, with belching, soreness, regurgitation, and nausea.

Roentgen diagnosis: Postpyloric ulcer, producing gastric dilatation and a twenty-five hour food retention.

Surgical findings: An obstructive postpyloric ulcer was found and a gastroenterostomy done.

Subsequent history: Patient entirely well, with no symptoms since operation.

CASE IV. (Fig. 4.)

Clinical history: Duration for four or five years, with symptoms of belching, regurgitation, and nausea after eating. Some pain and distress from gas.

Obstruction and gastric retention at twelve hours were the basis of the diagnosis of ulcer.

Subsequent history: Under carefully regulated medical treatment, including daily lavage, there was some improvement, but there remained distinct stomach symptoms.

The indications for surgical procedure were just as definite in Group II as in Group I, and the author advised surgery in these cases, but at the time this article was prepared only four of the eight cases had been operated upon and those four were compared with the other four, which were treated medically.

The subsequent clinical history of these cases indicated that those which were treated surgically were almost completely relieved of their symptoms, while those which were treated medically continued to live, but required a careful dietary and, in many instances, gastric lavage. In one of the cases treated medically, on repeated occasions I strongly advised surgical procedure, but owing to the transitory symptoms, which were present only immediately after nervous strain, it was not resorted to, but during one of these attacks the ulcer ruptured and an emergency operation was necessary. At this time it was impossible to do a gastroenterostomy, and the patient is now in the same condition as previously.

Group III. When the roentgenograms show that the ulcer is, as Moynihan states, "clean, punched-out, with the crater deep in proportion to its width and with sides which are thick, turgid, and indurated," there are definite indications for surgical procedure. In our series there are four cases which fall definitely in this group, and in all such cases as these we believe surgical procedure is definitely indicated.

This group will be illustrated by a single case, and, in contradistinction and for comparison with this extensive pathology, which is observed roentgenographically and later proved surgically, we are using an additional case with a minute punctate ulcer, which is probably limited to the mucosa of the cap, without evidence of induration or cicatricial contraction, and without any deformity of the cap other than the small mucosal indentation and perhaps adherent to the under surface of the liver. In one case surgery is definitely indicated and in the other medical treatment is definitely indicated.

CASE V. (Fig. 5.)

Clinical history: Epigastric pain fifteen years before. Entirely relieved by milk diet for a period of six years. Since that time have been intermittent attacks of epigastric pain and belching.

Roentgen diagnosis: Cap contracted and asymmetrical, indicating postpyloric ulcer.

Surgical findings: Indurated mass in the pyloric region, with many adhesions. Excision performed. Microsection proved nonmalignancy.

Subsequent history: Patient developed lobar pneumonia on the second day and succumbed.

CASE VI.* (Fig. 6.)

Clinical history: Acute pain in the epigastrium for two weeks, coming two hours after eating, relieved by alkalies.

Roentgen diagnosis: A small punctate ulcer on the lesser curvature surface of the cap, without induration or cicatricial contraction.

Subsequent history: This patient followed a rigid medical treatment for ulcer for a period of two weeks, at the end of which time all of the symptoms of ulcer had disappeared. This patient has remained now without a recurrence of symptoms for a period of six months.

In this group of cases, with a deep, penetrating ulcer, with thickened walls, even with the absence of any pyloric stenosis, surgical procedure is indicated definitely.

Group IV. The cases of group IV are those in which the induration or cicatricial contraction has transgressed the pylorus and in-

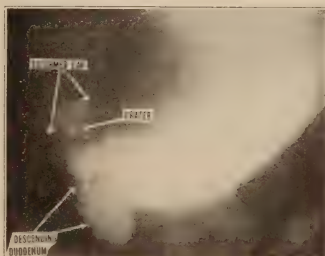


Fig. 5.—Illustrates group 3, Surgically treated.



Fig. 6.—Illustrates group 3. Medically treated.

involved the pyloric end of the stomach. These offer an interesting and exceedingly important group of cases, if we are to accept the teaching of the times that gastric lesions frequently become malignant and that duodenal lesions rarely become malignant. The value of the roentgen indications in this important group of cases lies in the fact that the exact location of the induration relative to the pyloric sphincter can be determined with a greater degree of accuracy than can be determined even by opening the abdomen and by palpation and inspection of the viscus. The importance of this group, in their relation to precancerous indurated areas of the pyloric end of the stomach, cannot be overestimated. This group is illustrated by a single case.

CASE VII. (Fig. 7.)

Clinical history: Indigestion for two or three years; one intestinal hemorrhage; chronic indigestion for a year. Epigastric pain and pressure around the heart. These symptoms were relieved by alkalies. A weight loss of 7 or 8 pounds recently.

Roentgen diagnosis: Early peristalsis obstructed at the extreme pyloric end of the stomach. No peristalsis during latter period of digestion, with a gastric retention. Constant irregularity and retention were the basis of post-pyloric ulcer diagnosis.

Surgical findings: Anterior wall of cap completely destroyed and covered by thickened gastrohepatic omentum, with extensive adhesions. Adhesions to the gall-bladder and pyloric end of the stomach. The absence of cap wall was due to the coalescence of several postpyloric ulcers. Adhesions were freed, opening in duodenum closed and gastrojejunostomy was performed.

Subsequent history: Entirely relieved of all symptoms.

Considering that prepyloric indurations are prone to become malignant, we believe that surgical procedure is definitely indicated in this type of case, and that one of the types of pylorotomy, with the removal of the ulcer-bearing area, is the operation of choice in

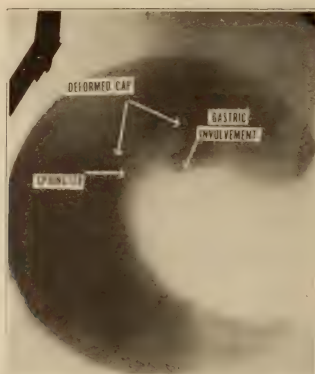


Fig. 7.—Illustrates group 4. Surgically treated.

preference to a gastroenterostomy, which would not remove the induration.

Group V. This group contains those cases in which there is a marked deformity or obliteration of the cap, but in which the normal peristalsis or compensating peristalsis causes the stomach to be completely or nearly evacuated in six hours. In this group there were twelve cases; six were treated surgically and six medically. In this group of cases we have been exceptionally fortunate in being able to obtain accurately the subsequent clinical history, and these histories are given in detail under the following six cases:

CASE VIII. (Fig. 8.)

Clinical history: Not obtained.

Roentgen diagnosis: A lesion involving the extreme pyloric end of the

stomach, not having the characteristic appearance of a new growth and producing cap deformity, led to a diagnosis of ulcer, with considerable infiltration.

Surgical findings: A mass the size of a walnut was removed, which at the time of operation had the appearance of malignancy, but microsection proved the lesion to be a tuberculous one.

Subsequent history: Under hygienic dietetic treatment the patient made rapid progress and after nine months was considered as cured.



Fig. 8.—Illustrates group 5. Surgically treated.

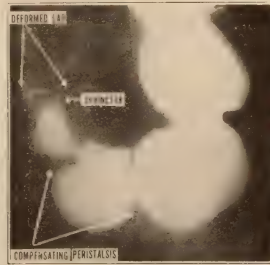


Fig. 9.—Illustrates group 5. Medically treated.



Fig. 10.—Illustrates group 5. Surgically treated.

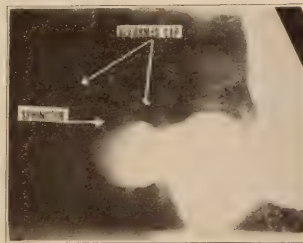


Fig. 11.—Illustrates group 5. Medically treated.

CASE IX. (Fig. 9.)

Clinical history: Much depleted from several operations; present symptoms were constant pain in the region of the liver and gall-bladder, with belching, regurgitation, and nausea, which had no relation to eating.

Roentgen diagnosis: At the time of the original examination, which was one of the earlier cases examined by this method, the exact nature of the lesion was not recognized. A subsequent restudy of the original plates in the light of added knowledge reveals clearly an unmistakable evidence of post-pyloric ulcer.

Subsequent history: A report five years after the examination states that the patient, after medical treatment, is perfectly well.

CASE X. (Fig. 10.)

Clinical history: Not obtained.

Roentgen diagnosis: Complete absence of cap and sphincter and retention led me to a diagnosis of postpyloric ulcer, with distinct evidence of adhesions.

Surgical findings: Presence of adhesions confirmed and possibly an ulcer.

Subsequent history: With great dietetic care this patient was able to live fairly comfortably. Later a second operation was done.

CASE XI. (Fig. 11.)

Clinical history: Periodic attacks for ten years of epigastric pain, relieved until recently by alkalies; appetite not good; belching, regurgitation, and nausea.

Roentgen diagnosis: Gastric dilatation, retention, and a crater on the anterior surface of the cap led to a diagnosis of postpyloric ulcer.

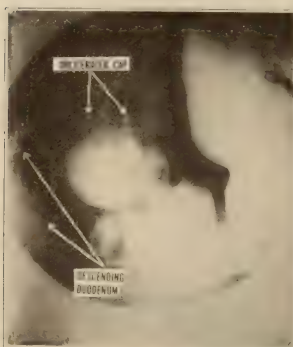


Fig. 12.—Illustrates group 5. Surgically treated.



Fig. 13.—Illustrates group 5. Medically treated.

Subsequent history: With careful medical treatment and strict diet the symptoms all disappeared.

CASE XII. (Fig. 12.)

Clinical history: Complained for a year and a half of severe epigastric pain, accompanied by nausea, belching, occasional burning, and great soreness. A weight loss of about 40 pounds.

Roentgen diagnosis: Complete absence of cap, hyperperistalsis, and gastric retention led to a roentgen diagnosis of postpyloric ulcer.

Surgical findings: Obstructive postpyloric ulcer found, gastroenterostomy done.

Subsequent history: "Uninterruptedly well."

CASE XIII. (Fig. 13.)

Clinical history: Acid stomach for a long period. Previous diagnosis of Bright's disease. Now suffers with burning sensation and some epigastric soreness; can eat no starch.

Roentgen diagnosis: Contraction of the right side of the cap, with evidence of adhesions. Diagnosis of postpyloric ulcer.

Subsequent history: Three years after the diagnosis patient reported as being perfectly well; has been treated medically.

In summarizing these cases, to use an old time expression, they are "six of one and a half dozen of the other." In consideration of the indications of postpyloric ulcer as a whole, it is evident that we must admit the value of the clinical history, and those cases which have perfectly typical histories of postpyloric ulcer fall into this group and the groups previously described. If we consider that the characteristic postpyloric ulcer is a more or less progressive lesion, it is these twelve cases that connect those which are definitely surgical with a larger group which are definitely medical. At least half of them have recovered as completely from medical treatment as have those from surgical. In this particular group the severity and repeated recurrence of the symptoms must be considered in determining whether the case is to be treated medically or is to fall into the surgical group.

Group VI. In the remaining 63 percent, where there is cap deformity, characteristic of postpyloric ulcer, but *without* stenosis, crater, or secondary gastric involvement, the symptoms are usually not so severe. Now that the symptomatology of postpyloric ulcer is so well recognized by the general practitioner, we are frequently asked to examine cases during the first attack, or at least before the chronicity of the process is thoroughly established. Therefore, in these early cases one does not expect to find the induration or cicatricial connective tissue which is observed in the prolonged, chronic cases which have resulted in stenosis, deep turgid crater, or secondary involvement.

One frequently sees cases with a perfectly typical history of postpyloric ulcer, except that the attack lasts only a week or two and then subsides, and the patient never has another such attack; or they are separated by such wide intervals and are so slight that they cause very little inconvenience to the patient. These cases have a deformity of the cap, which is just as typical of postpyloric ulcer as are the more severe cases, where the pyloric stenosis demands surgical intervention.

In the very early stage this is manifest by a small punctate ulcer limited to the mucosa or submucosa (Fig. 6), without extensive induration and without the cicatricial contraction. These cases, when the ulcer involves only the mucosa, may heal without any permanent deformity of the cap.

If, on the other hand, the ulcer becomes deeper and involves the muscular coat, there will be a definite area of induration, surrounding the crater, and connective tissue will form when the muscular coat is destroyed. Then, if the ulcer heals, or even if it does not

heal, the connective tissue cicatrizes and results in a cicatricial deformity of the cap, which is so characteristic of postpyloric ulcer.

Even after the crater heals, these deformities remain, sometimes with mild symptoms, sometimes without any symptoms.

If for any reason such a case is examined roentgenographically, it may be readily detected, and, if it is operated on, the characteristic appearance of the surface of the gut is observed. This condition is illustrated in the following case:

CASE XIV. (Fig. 14.)

Clinical history: Localized pain in epigastrium intermittently for a period of three years, which was relieved by medical treatment. Previous operation for chronic appendicitis, at which time an ulcer of the pylorus was observed.

Roentgen diagnosis: Was made one year following the appendix operation



Fig. 14.—Showing cicatrix of healed ulcer.

on cap deformity, and there was no question as to the presence of a postpyloric ulcer.

Subsequent history: At the time this roentgen diagnosis was made an opinion was expressed to the patient that there was unquestioned evidence of a postpyloric induration, which had all the appearance of being a healed lesion, and the subsequent history of the case has borne out this estimate.

The following 10 cases are used to illustrate Group VI:

CASE XV. (Fig. 15.)

Clinical history: Intermittent attacks of indigestion for ten years, the attacks more severe in the last few weeks. These attacks consisted of pain, belching, and loss of appetite.

Roentgen diagnosis: The constant deformity of the cap, the permanent indentation of the upper edge, and the pouching of the lower portion were the evidence in favor of the diagnosis of postpyloric ulcer.

Surgical findings: A small postpyloric indurated area was found $\frac{1}{4}$ inch behind the pyloric valve. Gastroenterostomy was performed.

Subsequent history: Shortly after the operation the patient felt very much improved, and a few months later her physician reported that the symptoms had become very much aggravated.

CASE XVI. (Fig. 16.)

Clinical history: The initial symptoms had occurred twenty years previously, but they had been markedly aggravated during the previous three or four years. His attacks were marked by severe pain in the left side and occasionally in the lower abdomen. The symptoms were relieved by food. He suffered violent attacks of belching and soreness, which were relieved by pressure.

Roentgen diagnosis: Evidence of an ulcer on the upper surface of the cap.

Subsequent history: After a short period of medical treatment the patient was entirely free of symptoms. Later the symptoms returned, but in a slight

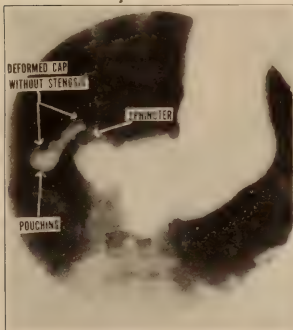


Fig. 15.—Illustrates group 6. Surgically treated.



Fig. 16.—Illustrates group 6. Medically treated.

degree, and were controlled by medical treatment. Later still he was reported free from symptoms.

CASE XVII. (Fig. 17.)

Clinical history: Duration, six years. Complains of a "gnawing" sensation and soreness in the epigastrium. The attacks have been intermittent, the last one extending over a period of one month.

Roentgen diagnosis: The cap was deformed, especially on the anterior surface. There was a slight pouching posteriorly and to the right. A diagnosis of an indurated ulcer of the cap, with adhesions involving the extreme pyloric end of the stomach, was made.

Surgical findings: Large indurated ulcer on the anterior surface of the cap; pylorotomy and posterior gastroenterostomy was done.

CASE XVIII. (Fig. 18.)

Clinical history: Complained of recurring pain four hours after meals, with occasional burning and considerable belching. There had been similar symptoms ten years before due to chronic appendicitis, which were relieved by operation.

Roentgen diagnosis: Cap asymmetrical and contracted. Peristalsis unobstructed, except at the extreme pyloric end of the stomach. Diagnosis of cicatricial contraction on the anterior surface of the cap was made.

Subsequent history: A report one year later stated that the patient had a chronic moderate hyperchlorhydria, which did not interfere with normal digestion. General nutrition good, weight more than normal. Patient looks perfectly well.

CASE XIX. (Fig. 19.)

Clinical history: Six years' duration, marked by poor appetite and dull pain, with some soreness.

Roentgen diagnosis: Adhesions at the pyloric end of the stomach and duodenum. Probably an old ulcer, possibly early malignant changes, with marked adhesions.

Surgical findings: An indurated postpyloric ulcer was found not adherent to the liver.

Subsequent history: Inquiries show the patient dead.



Fig. 17.—Illustrates group 6. Surgically treated.

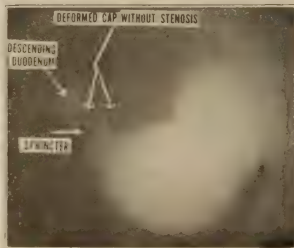


Fig. 18.—Illustrates group 6. Medically treated.

CASE XX. (Fig. 20.)

Clinical history: Hemorrhage from the stomach seven years previously, periodical trouble since that time, occasionally becoming acute; symptoms being marked by belching and some nausea; only liquid food was eaten. Has lost 15 pounds in fifteen years.

Roentgen diagnosis: A contracted cap, obscured sphincter, were definite evidence of a lesion involving the cap. A diagnosis of postpyloric ulcer was made, but the obstruction was not considered sufficient to warrant surgical procedure.

Subsequent history: The patient was treated medically, with marked amelioration of his symptoms. The patient has shown occasional exacerbations when he was not entirely free from pain, but the symptoms have never been sufficiently severe to warrant surgical procedure.

CASE XXI. (Fig. 21.)

Clinical history: Not obtained.

Roentgen diagnosis: Two examinations were made of this patient. The first showed an active peristalsis obstructed at the pyloric end and an irregular cap and sphincter. The second showed the peristalsis much more active than

the first and an irregularity in the greater curvature. Probably at the point of a gastroenterostomy, but with no evidence of bismuth passing through the stoma. Diagnosis of postpyloric ulcer.

Surgical findings: This patient had had a previous gastroenterostomy for postpyloric ulcer. Within a few days after the x-ray examination the appendix was removed by Dr. Lambert and numerous adhesions found.

Subsequent history: Complete relief resulted for a time; subsequently gastric distress returned and was relieved by small doses of atropine.

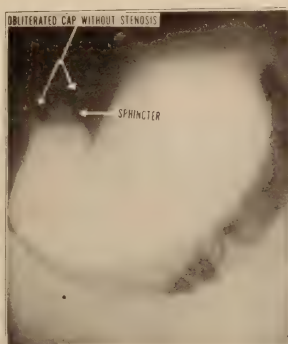


Fig. 19.—Illustrates group 6. Surgically treated.

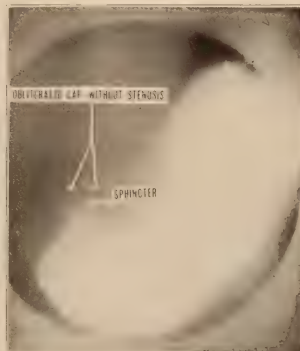


Fig. 20.—Illustrates group 6. Medically treated.

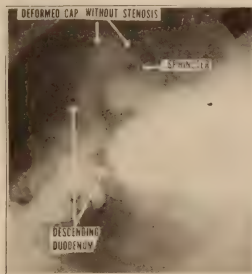


Fig. 21.—Illustrates group 6. Surgically treated.



Fig. 22.—Illustrates group 6. Medically treated.

CASE XXII. (Fig. 22.)

Clinical history: Not obtained.

Roentgen diagnosis: A feeble peristalsis, but unobstructed. A contracted cap, which was irregular and had a worm-eaten appearance, together with the abnormal appearance of the pyloric valve, were indicative of a postpyloric

ulcer or gall-bladder infection or adhesions, the weight of evidence being in favor of ulcer.

Subsequent history: This patient received medical treatment and has since been reported as well.

CASE XXIII. (Fig. 23.)

Clinical history: Not obtained.

Roentgen diagnosis: Evidence of adhesions involving the cap. The deep crease, with the appearance of a constriction, led to a diagnosis of ulcer of the cap.

Surgical findings: Patient operated on for chronic appendicitis and a posterior gastroenterostomy was performed for postpyloric ulcer.

Subsequent history: Not obtained.



Fig. 23.—Illustrates group 6. Surgically treated.



Fig. 24.—Illustrates group 6. Medically treated.

CASE XXIV. (Fig. 24.)

Clinical history: Had suffered attacks for three summers, consisting of pain in epigastrium, burning, belching, slight soreness, and loss of appetite. Weight loss of between 20 and 30 pounds.

Roentgen diagnosis: Evidence of adhesions and induration, involving the cap. No evidence of obstruction. Medical treatment advised.

Subsequent history: A report three years later states that the patient was completely relieved of all symptoms by medical treatment.

We realize fully that medical treatment will not remove the deformity of the cap, but the symptoms of these cases even at their worst are rarely sufficiently severe to demand surgical procedure, because the symptoms are not those of stenosis or of a deep, thick, turgid ulcer. Therefore the relief from these obscure noncharac-

teristic symptoms by surgical procedure is not nearly as satisfactory as in the surgical group previously described. Rigid medical treatment, as outlined by Lenhartz, Sippy, and others, will relieve the symptoms with a greater degree of certainty than surgical procedure.

SUMMARY.

1. Serial roentgenography reveals the progression or retrogression of the pathology in postpyloric ulcers, and this method of examination, connected with the clinical progress of the patient, gives a definite indication for the choice of medical or surgical treatment.

2. Postpyloric ulcers evidenced by an obliterated cap and pyloric or postpyloric stenosis and broken gastric compensation demand surgical intervention.

3. Postpyloric ulcers evidenced by an obliterated or deformed cap, and with pyloric or postpyloric stenosis and failing gastric compensation, require surgical intervention.

4. Postpyloric ulcers evidenced by a deformed or obliterated cap without stenosis, but with a deep crater and thick edges, require surgical intervention.

5. Postpyloric ulcers evidenced by an obliterated or deformed cap and secondary gastric involvement require surgical intervention, with removal of the induration.

6. Postpyloric ulcers evidenced by an obliterated or deformed cap and with compensating peristalsis are a borderline group, where the choice of procedure must be determined by the clinical progress and subsequent roentgen examination to determine the progression or retrogression of the lesion.

7. Postpyloric ulcers evidenced by simple cap deformity and with or without slight stenosis, and with a normal or compensating peristalsis and without deep crater or secondary gastric involvement, are more completely relieved of their symptoms by medical treatment than by surgical intervention.

GROUP STUDY—A PLEA FOR MEDICAL COOPERATION IN HOSPITALS.¹

BY FAYETTE WATT BIRTCH, M. D., San Francisco.

Your chairman has invited me to address the Mt. Zion Medical Society on the organization of "Group Study" as practiced by the diagnostic section of St. Luke's Hospital Clinical Club, with the hope that some stimulus may be given to those interested in Mt. Zion Hospital to undertake similar work.

Before any hospital staff desires to establish group methods for investigation of patients, its medical men must feel the need for a better system of diagnosis. If the individual method of investigation has been entirely satisfactory, the necessity for group study will not arise; but it will be necessary if individual diagnostic methods have led to erroneous conclusions, as have been reported from the Mayo Clinic, detailed by Foss in the *Annals of Surgery*, LXVI, 1916, under the title of "Errors in Abdominal Diagnosis;" by Richard Cabot from the autopsy material of Massachusetts General Hospital (Cabot, R. C., "Diagnostic Pitfalls Identified During a Study of Three Thousand Autopsies," *J. A. M. A.*, LIX, 2295); and by J. W. Nuzum from the Cook County Hospital, Chicago, in the *Journal of the American Medical Association*, LXVI, 482, February 12, 1916, under the title of "Needless Surgical Operations from Failure to Recognize Tabes Dorsalis." In the last instance, 87 out of 1,000 tabetics were operated upon one or more times under a mistaken diagnosis. Mistakes in diagnoses can creep into medical work in several ways—through insufficient knowledge of medicine, the improper taking of histories, the overlooking of details of special examinations, the improper recording of records, the misinterpretation of the findings, the lack of equipment, and inability of patients to pay for special examinations. In one or all of these ways every individual practicing medicine is continually making mistakes in diagnoses. Many blunders will be avoided by group practice, where more eyes examine the patient, more ears hear the history, and more brains interpret the findings; but group practice necessitates, through organization, the keenest cooperation of those undertaking the work.

The group study method of the diagnostic section of St. Luke's Hospital Clinical Club, detailed under the title of "A Group Study

¹Read before Mt. Zion Hospital Medical Society, San Francisco, December 6, 1916.

Plan for a Diagnostic Team Acting as a Laboratory for the Profession," published in the *Journal of the American Medical Association*, May 27, 1916, has a different aim, a different method, and is obtaining more satisfactory results than any other methods we have tried.

Twelve men interested in different fields of medicine have organized to investigate, systematically and collectively, referred cases, and to forward a diagnostic report on the return of the patient, for which a fee is charged commensurate with his financial status. The aim of this group is to have men organized as laboratory workers for the profession, conducting the examination in exactly the same way as is done by the roentgenologist when the patient is referred to his laboratory. The patient is never considered by the workers as a private patient, but always as the property of his family physician.

The method of case study under this organization is strikingly different from other types of study. In this it has been found necessary for each individual on the team to examine the patient and make a written report of his findings. In this way it often happens that findings are discovered and deductions are made by those specially trained which were entirely overlooked by the general medical man, and even a negative report from a specialist is frequently of the greatest importance to clarify the case. Again, each man in the team takes his individual history, and frequently elicits much valuable information which had been overlooked in the general history. The sum total of facts thus obtained over the general medical investigation has far exceeded our anticipation. This plan makes it possible for the physicians who have not at their disposal specialists and proper hospital equipment to secure for their patients complete examinations.

The plan has also been constructed with due consideration for the patient. X-ray laboratory examinations and specialists' reports are often so expensive that a patient in moderate circumstances cannot secure them. In this work we have arranged a fee schedule based on the income of the patient. The schedule is \$35 per \$100 income per month. It often happens that more than this whole fee is spent in x-ray investigation at ordinary laboratory charges, while others may require little or no x-ray examination. By this cooperative scheme it is found that this pays a small margin over the running expense.

The doctors engaged in this group practice are compensated for their time spent (which is about that required for the care of any hospital service) by increasing their medical education through the privilege of listening to their colleagues in daily discussion of advanced ideas in medicine, by receiving intense stimulation from their alert coworkers, by ascertaining the true valuation of others'

findings and interpretations, by being able to see developed a comprehensive clinical picture of patients, and, lastly, by the advancement of the individual's personal reputation by being connected with an organization struggling for good medicine.

The plan is constructed to make hospitals an influence for better medicine, this influence to extend out in an ever-widening circle. It is manifestly impossible that such an organization could be established in isolated parts of the country, but all well-equipped hospitals—that is, with 100 beds or more—should be able to organize a diagnostic team which would be able to carry medicine to members of the profession where such organization is impossible.

We will not here go extensively into the technic of our method of conducting cases, but in a general way it is as follows: This section consists of twelve men, each having special training along some particular line. The members of the profession refer obscure cases to this section for diagnosis. These patients are placed in the hospital for observation, and each member of the diagnostic team makes an individual examination and a written report of his findings. At noon each day the team meets to discuss the cases. If the case is not clarified, further investigation is recommended, and any new findings are reported the following day. This method of procedure is continued day after day until some conclusion is reached. The physician who referred the case is asked to be present at all of these meetings. Finally the patient is sent back, and a written report of the findings and recommendations for treatment are mailed to the attending physician.

The diagnostic section of St. Luke's Hospital Clinical Club, San Francisco, was organized October 13, 1915, and has now been in operation a little over a year. It has received 265 private patients for examination. The average stay in the hospital is four and one-fifth days. The number of medical hours given to a patient in these four days is approximately eighteen. The average number of diagnostic reports in each case is seven. One hundred of the first 251 cases had major surgical pathologic conditions, but, for various reasons, only 24 were recommended for immediate operation.

This work has been likened to that of the diagnostic section at the Massachusetts General Hospital and the Mayo Clinic at Rochester, Minn. There could be nothing more erroneous. In these clinics the patient is examined by a clinician and then referred to others for reports according to indications. We believe that the autopsy reports, the operative findings, and the results of treatment have proved too frequently that it is impossible for individuals to examine a patient and accurately orient him into his proper department. The individual unconsciously focuses his attention on the most obvious pathologic condition and loses sight even of detected

morbid states in other divisions. The time element absolutely necessary to investigate a patient completely is prohibitory in individual practice. In four days the combined medical time spent by our team investigating a patient is eighteen hours. This amount of time can be spent only by some method of cooperation. The clinician who examines a patient and suggests a few consultants for him will omit routine examinations in many departments, and consequently obscure pathological findings may be hidden in the unexplored fields. Many of these may be of great bearing on the outcome of the case. Others will be of importance to the individual from a prophylactic standpoint, for preventive medicine can develop only to the degree with which our investigation of the minor lesions of the patient approaches perfection.

In conclusion, I will state that if you agree that a group of organized individuals will do better work than one individual, if you agree that men trained as a team will work better and more efficiently than an untrained team, if you see the need of opinions of those specially trained, if you agree that often consultants' reports are too expensive for the patient, then you qualify for all the requirements of group study as practiced by the diagnostic section of St. Luke's Hospital Clinical Club. I am convinced that if several of our larger hospitals in San Francisco will undertake this work, a type of clinical medicine will be developed here unequaled by any of the older methods. If Mt. Zion's medical staff, or the staff of any hospital, seriously considers such an organization, St. Luke's Hospital will cooperate in every way. It may be advisable for hospitals to affiliate closely in order that ideas may be exchanged for the good of all. The closer we affiliate in the effort for better medicine, the greater will be our influence in the medical community. There is no occasion for competition. We should make the medicine of our hospital rank as high as the individuals connected with the institution can make it. We have left too much for the universities to do. We have depended on them to set the pace. It is not necessary. Initiative should be in us also. We have capable and well-trained men. We must unite in greater effort along definite lines. Let us develop a type of medicine on this coast having a brand of originality; then, by cooperation of hospitals, San Francisco can be made a great medical center. Individualists say it cannot be done, but our experience teaches us that the only obstacle is lack of work. Let this be overcome.

INTESTINAL TUBERCULOSIS.

By L. FRANKEL, M. D., AND PAUL EISEN, M. D., North Chicago Hospital.

The roentgen ray appearance of intestinal tuberculosis is sufficiently characteristic to warrant this method of examination. Intestinal tuberculosis in otherwise healthy-appearing individuals is seldom suspected, and yet, when met with by surgeons, is often so far advanced that the failure to suspect its presence reflects badly on our methods of diagnosis. Although Stierlin some time ago advocated the use of the roentgen rays in its detection, this suggestion has been but little developed. Some account of the combination of roentgen ray and approved clinical methods of investigation in this disease should be of sufficient value to justify publication.

Many so-called adhesions, causing kinking of the bowels, may have been primarily of a tuberculous nature, because it is well known that, although at the first laparotomy the abdominal parietes is found sprinkled with tubercles, at a second laparotomy following only months, sometimes a few years later, no definite sign of tuberculosis may be detected.

The tuberculous nature of an intestinal lesion is proved only by the presence of the tubercle bacillus in the lesion or by the changes it produces, when these changes are known to be characteristic of tuberculosis. These differ according to the stage in which they are and the amount of reaction the body cells have produced in their vicinity. The presence of tubercle bacilli in the feces proves nothing as to their intestinal origin; they can be swallowed with sputum or originate in an extrinsic tuberculous lesion—i. e., of the urinary or sexual organs—communicating with the intestines. The localization of tuberculosis seems to have certain points of predilection, whereas "the pancreas, stomach, and duodenum appear to be peculiarly exempted from infection." (Maylard.)

The localization of each tuberculous ulcer cannot, at present, be outlined in the course of a roentgenological study, including stereoscopic plates, but the general extent and distribution of the hyperplastic process can be outlined by the spacing it produces. To say, however, that other parts not giving any characteristic findings for tuberculosis are not yet involved is asserting too much.

On the other hand, secondary changes wrought by the advance of the lesion, such as inflammation or abscess formation causing strictures, can often be strictly located. In this manner the extent of the tuberculous lesion can often be more accurately defined than by palpation and regard to pain alone, as the x-ray appearance of the diseased bowel is in marked contrast with that of

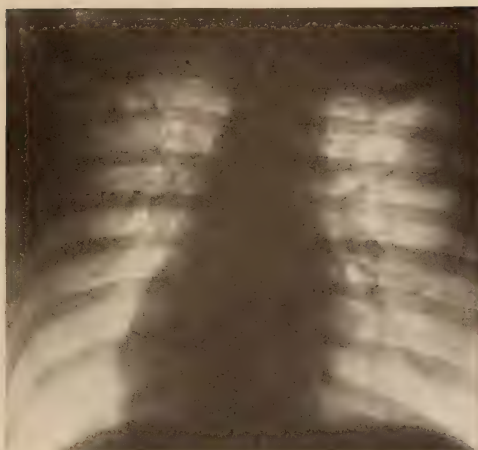


Fig. 1.

the healthy intestinal canal. In order to define the characteristic roentgenological findings in intestinal tuberculosis, we must either divide the lesions according to their stages of development or according to their nature. The latter is more practical, because to



Fig. 2.

separate the different stages is possible only from a pathological study of the excised gut. We would, therefore, differentiate ulcerations in their different stages of activity and healing, hyperplasia with narrowing of the lumen, obstruction of the bowel, due to cicatrization or angulation due to adhesions, edema, glandular involvement, ascites and abscess formation, *fixation*, and permanent displacement of bowel by peritoneal adhesions.

Even while the peritonitis is still strictly localized, miliary tubercles may be recognized on the serosa. Not only are these and many other changes in the anatomy of the bowel discernible as to their localization and extent, but, of more importance, being recognized at an early stage, are the physiological changes of the bowel contents themselves, as seen after a meal, that attract our attention. From our own experience we believe we can detect diarrhea in the upper intestinal tract before even most careful examination of the feces can prove its presence. We not only note the fluid nature of the bowel contents in parts of the colon where they should be solid or soft, but in good stereoscopic plates we can recognize the changes caused by the mixture of slime with the bowel contents, and actually see strings of mucus mixed with barium in the bowel. While these changes are only characteristic of diarrhea, the latter is the most persistent symptom of intestinal tuberculosis; and where the clinician is still under the impression that he is dealing with constipation, the roentgenologist has already definite proof of a beginning diarrhea. As some of our cases had extensive feces examinations before and after operation, we can prove the truth of this seemingly paradoxical statement.

As an illustration of the invaluable aid the roentgen ray offers in the detection of intestinal tuberculosis, we will cite more in detail one case (IV) of ileocecal tuberculosis that was operated upon by Dr. Emil G. Beck, December 5 and 29, 1914, at the North Chicago Hospital. To the description of the clinical findings in Case IV the following roentgen ray findings are added. The stereoscopic plates of the lungs show a circumscribed area in the right upper lobe, at the fifth and sixth dorsal ribs, of increased density, of a flocculent nature, not sharply defined, as of an active lesion, with two corresponding large mediastinal glands at the hylus (Fig. 1). The fluoroscopic examination of the stomach gave no signs of ulcer, but distinct evidence of obstruction, of an intermittent nature, at the pyloric sphincter, possibly due to spasm. There was a large six-hour residue (Fig. 2), expansion of the distal or evacuating channel of the stomach, and hyperperistalsis twenty-three hours after the meal, the barium being distributed over the entire large and over the distal part of the small bowel and even filling the rectum (Fig. 3). The colon contained large quantities of mucus. The appendix lumen was visible, very painful on pressure, on displacement, and on traction, lay behind the ascending colon, and was

brought to view by displacing the latter. These findings justified, together with the clinical findings, the assumption of appendicular involvement, which was verified at operation, the appendix being removed as diseased. On the roentgen ray plates nothing characterizing the lesion of the appendix as tuberculous was seen. But the spacing of the bowel at the ileocecal junction in the roentgen plates, so characteristic of tuberculosis, was completely overlooked, and the distribution of the intestinal contents over the whole intestinal canal, with evidence of mucus, showed plainly the presence of diarrhea, but its significance as a sign of tuberculosis was not appreciated at the time—December, 1914 (Fig. 4). The excised



Fig. 3.

bowel of the first specimen at a second operation shows the outward appearance of the terminal ileum and cecum. Compare this with the roentgen plate of the hardened specimen (Fig. 5) and the photograph of the opened gut (Fig. 6). In the latter we see small and very large ulcers, the latter separated by ridges which nearly completely obliterate the lumen of the bowel.

After the extirpation of the ileocecum, we neglected to fill the fresh excised lumen with hot barium wax; otherwise we could have compared this with the original plates. The formalin hardened specimen was, however, exposed to x-rays, and one may note the lumen as it appears filled with air and compare it with the external and internal appearance of the bowel and with the roentgen ray appearance of the living bowel. We see not only the narrow-



FIG. 4



FIG. 5.

ing of the lumen due to hyperplasia, but can see the pockets, at the base of which are the ulcers and the ridges separating them. Studies of this nature will be followed up in future, and in time may reveal to us further characteristic changes in the intestinal canal, as they have to us in the past in ulcers of the stomach. The diastalsis of the small bowel is too rapid, its contents too liquid, to permit of careful fluoroscopic observation; in the large bowel it is seldom seen (mass movements). Stereoscopic plates alone offer themselves for careful study. Segmentation, of a permanent nature, in the intestinal canal ought in time offer us the same assistance it does in recognizing stomach lesions, especially as we become more familiar with its appearance in our intestinal plates.

Fixation at one point of the bowel is not in itself so characteristic



Fig. 6.

as broad and extensive adhesions. The matting of large lengths of intestinal loops in cases where neither operation nor acute infection can be found in the history is one of the most dependable findings in intestinal tuberculosis. Permanent displacement of the bowel, especially by fluid, which can be directly demonstrated fluoroscopically, or by adhesions, tumor formation (false tumor), or by mesentery glands, leads one directly to suspect tuberculosis.

Most misleading in our experience has been not only the remarkably healthy-looking appearance of the eleven persons we have examined, but the total absence, clinically and roentgenoscopically, of any distinct tuberculous lung lesions, and of fever in all but one case, and the indifferent clinical findings. In all other cases the origin of the disease appeared to be intestinal.

NEUROTOLOGY.

BY LOUIS K. GUGGENHEIM, M. D., St. Louis.

About ten years ago an interesting anatomic structure was transformed, as it were, into a living organ, subject to different disease processes. Prior to this, it may almost be said, there was but one disease of the aural labyrinth—namely, Ménière's. Bárány, making use of certain well-known facts in connection with the physiology of the internal ear, was able to demonstrate that in labyrinth affections there are deviations from the normal reactions, and also that certain spontaneous phenomena—previously observed, but not understood—are directly the result of the ear disease. The terms diffuse suppurative labyrinthitis, labyrinthitis serosa, circumscribed labyrinthitis, etc., were substituted for the vague term, "Ménière's disease."

A few years later this indefatigable worker became interested in spontaneous deviations accompanying voluntary movements of the extremities. This phenomenon, first described in connection with eye muscle palsy, was observed by Bárány in a case of cerebellar abscess and in normal individuals after stimulation of the static labyrinth. Later the cooling experiment was tried on cases previously operated upon for sinus thrombosis and other conditions which had necessitated the removal of bone posterior to the auricle. This led to the localization of centres in the cerebellar cortex which are supposed to control certain body movements.

In Philadelphia, several years ago, a University of Pennsylvania man, realizing that every one connected with a medical institution is expected to do original work, went to his chief for advice. Dr. Randall suggested that an examination of 500 external auditory canals, with report of findings, might prove of scientific interest; but this did not sound good to Isaac Jones. He bethought himself of Bárány, and decided to work with the vestibular apparatus, in the hope of coming across something new. He soon became interested in the intracranial paths of the ramus vestibularis, not only as an explanation of vestibular reactions, but as the means of brain localization. Working alone, with nobody to "fight," is not conducive to sustained interest; so Jones associated himself with Lewis Fisher and Seth Brumm. The trio discontinued their routine work at the university clinic and devoted their time to turning and douching. Their limitations neurologically were soon felt, so they associated themselves with Mills, Spiller, and Weisenburg, to whom they constantly appealed for an explanation of this, that, and the

other phenomenon. The learned neurologists welcomed the "boys," but didn't take the Bárány tests very seriously until Steven Futo appeared. Steven had all the classical symptoms of cerebellar disease. This was a splendid opportunity for Jones and his associates to try the pointing tests. Although manifesting marked incoordination, Steven touched the outstretched finger every time. Hearing was normal; turning with head in different positions elicited normal nystagmus, vertigo, and past-pointing; douching the ears resulted in the usual nystagmus, vertigo, and past-pointing. According to Bárány the cerebellum was normal. The trio decided to come back in a week or two and try it all over. At the next examination Steven touched as before. The right ear was douched with cold water, but failed to react. Hearing was still perfectly normal. A normal cochlea and a dead static labyrinth they could not understand in view of the fact that the cochlear division of the labyrinth is more delicate than the static portion, and therefore succumbs first to diffuse inflammation of the internal ear. The other ear was tested—hearing normal but no caloric reaction. This was too much for the three worshipers at the shrine of Bárány. They decided to quit work for the day. Gently they placed Steven Futo on his bed. The moment he reached the recumbent posture there occurred a violent horizontal nystagmus. Jones immediately declared there must be separate fibers for the horizontal and the two vertical canals, and that in this case the labyrinth was normal, the abnormality being an intracranial interference with the vertical canals fibers. Finally Steven Futo died. Autopsy revealed tubercular meningitis with internal hydrocephalus; the cerebellum was not involved; the symptoms referable to that organ had resulted from increased pressure in the fourth ventricle.

PRACTICAL USES.

It must be understood that those practicing neurotology are not neurologists, nor do they attempt to make neurologic diagnoses. They feel that just as the ophthalmologist may be of service to the neurologist in the examination of the eyes and the optic nerves with their intracranial pathways, so the otologist may be of assistance by examining the ears and the eighth nerves with their pathways through the neuraxis, cerebellum, and cerebrum. Every case of vertigo, regardless of primary cause, is ultimately the result of a disturbance of the vestibular apparatus (static labyrinths and vestibular nerves, with their brain pathways and nuclei). For this reason every case of vertigo should be examined neurotologically. With few exceptions, the portion of the vestibular apparatus disturbed can be localized and often the nature of the disturbance can be ascertained. Lesions in the static labyrinth, ramus vestibularis, neuraxis, cerebellum, and cerebrum can often be localized

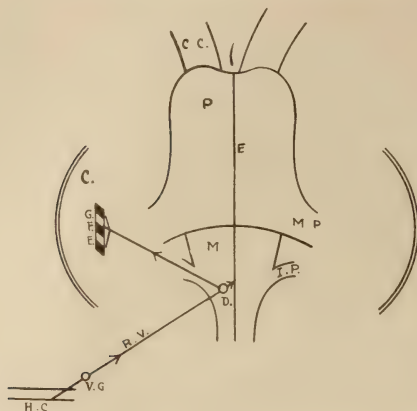


Fig. 1.—Nystagmus and vertigo from the horizontal canal.

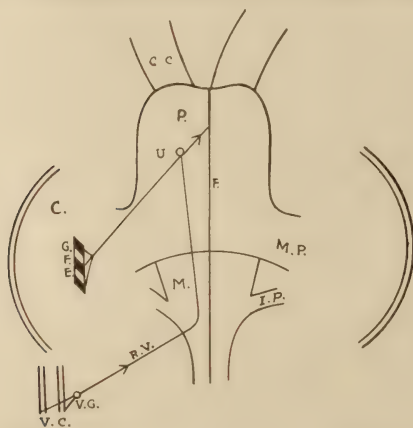


Fig. 2.—Nystagmus and vertigo from the vertical canals.

- | | | |
|---|-------------------------------------|--|
| A. Arm. | H. C. Horizontal canal. | R. V. Ramus vestibularis. |
| A. T. Accracy tract. | I. C. Internal capsule. | S. F. Superior peduncle. |
| B. C. Bárány center. | I. F. Inferior cerebellar peduncle. | T. L. Temporal lobe. |
| B. P. Brachial plexus. | M. Medulla oblongata. | U. Unnamed vestibular nucleus in pons. |
| C. Cerebellum. | M. P. Middle peduncle. | V. Vertigo center. |
| C. C. Crus cerebri. | P. Pons. | V. C. Vertical canals. |
| C. P. T. Crossed pyramidal tract. | P. C. Prerolandic center. | V. G. Vestibular ganglion. |
| D. Deiters' nucleus. | P. L. Parietal lobe. | V. T. Vertigo tract. |
| D. N. Dentate nucleus. | P. T. Pyramidal tract. | |
| F. Fasciculus longitudinalis posterior. | R. N. Red nucleus. | |
| G. F. E. Nuclei globosus, fastigii, and emboliformis. | | |

even in the absence of general neurologic findings. In some cases the progress made by brain lesions can be accurately detected by means of these tests. Perhaps the happiest of neurotologic functions is the prevention of unnecessary operations. Jones tells of a case in which all neurologic findings pointed to a lesion of the cerebellum and the *x-ray* showed very plainly a large cyst of that organ. The Bárány tests showed the cerebellum to be intact. Because of the neurotologic findings, no operation was performed. The

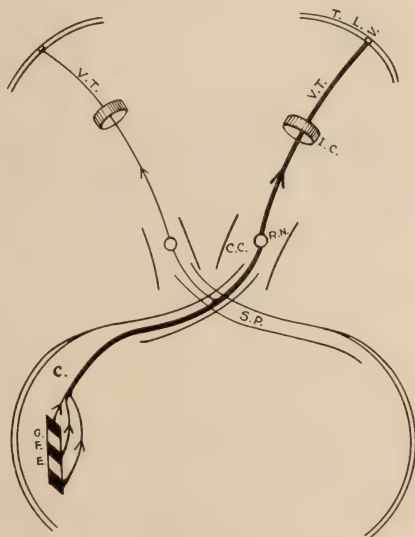


Fig. 3.—Vertigo.

patient has since given birth to a fine baby and is enjoying perfect health.

Judging from the results of recent investigations by Jones, there is every reason to believe that in neurotology we shall some day have the means of recognizing syphilis of the central nervous system long before neurologic symptoms have appeared. In the diagnosis of certain eye muscle conditions these tests prove of value to the ophthalmologist.

PATHWAYS.

The vestibular nerve fibers, after being interrupted in the vestibular ganglion in the internal auditory meatus, pass directly to the medulla oblongata, in which to the median side of the corpus

restiforme some divide into an ascending and a descending branch, the latter forming the most median portion of the spinal acoustic root. Some of the vestibular fibers end in the small cell vestibular nucleus, their continuations, which may be followed down to the hypoglossus, being known as the descending vestibular nucleus (nucleus intercalatus Staderini). Direct continuations of certain of the vestibular fibers also reach Deiters' nucleus and the nucleus angularis. These fibers, Jones believes, are from the horizontal canal only. From Deiters' nucleus proceed fibers, on the one hand, to the third and sixth nuclei of opposite sides through the fas-

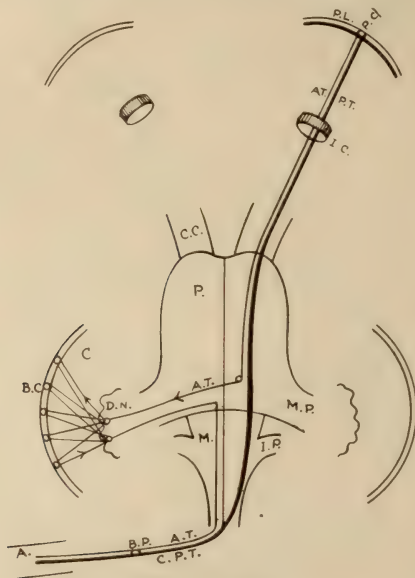


Fig. 4.—Pointing.

ciculus longitudinalis posterior; on the other hand, fibers (crossed and direct) pass from Deiters' nucleus downward to the motor cells of the anterior horns of the cord. The vestibular fibers from the horizontal canal give off collaterals just before they enter Deiters' nucleus. These collaterals, as well as fibers from Deiters' nucleus, pass through the inferior cerebellar peduncle (corpus restiforme) to the three cerebellar nuclei fastigii, globosus, and emboliformis.

In the ramus vestibularis are also fibers from the vertical canals. We have clinical evidence of the fact that these fibers, after entering the medulla oblongata, pass upward to end in a nucleus somewhere in the upper half of the pons. From this nucleus, fibers pass through the fasciculus longitudinalis posterior to the third and fourth nuclei of opposite sides on the one hand and through the middle cerebellar peduncle (brachium pontis) to the three cerebellar



Fig. 5.—Transverse section of the medulla through the upper end of the inferior olive (1), showing the beginning of the ramus cochlearis (2) of the nervus acusticus. The anterior cochlearis nucleus (nucleus accessorius acustici) (3) is seen anterior to the corpus restiforme (4), and is buried in the trunk of the nervus cochlearis. This nucleus takes up most of the fibers of the nervus cochlearis. Some of these fibers, however, combined with fibers springing from the anterior cochlearis nucleus, curve laterally around the corpus restiforme as the lateral acoustic root and find an interruption posterior to the corpus restiforme in the nucleus cochlearis dorsalis, the so-called tuberculum acusticum (5). The continuation of this system of the cochlearis is carried out by the striæ acusticæ (6), which run along the floor of the fourth ventricle toward the median line, crossing at different levels. Near the median line the fibers separate a little to take in the nucleus eminentiæ teretis (7). Just anterior to these striæ is the small cell triangular vestibular nucleus, the nucleus vestibularis parvocellularis (8). To the lateral side of this nucleus is seen in transverse section the spinal acusticus root, which may be divided into three parts; most median are the descending fibers of the vestibular (9), laterally the connection between the nuclei of the medulla and the cerebellum, the tractus nucleocerebellaris (10), which touches the restiforme body, and between the two the large cells of Deiters' nucleus, the nucleus vestibularis magnocellularis (11).

nuclei (globosus, fastigii, and emboliformis) on the other. Probably some of the vertical canals fibers cross in the pons to divide on the opposite side. From the cerebellar nuclei, fibers pass upward through the superior cerebellar peduncles to the cerebral cortex, those in each peduncle passing to both sides (the greater number crossing). From the superior cerebellar peduncles the fibers first pass to the red nuclei in the crura cerebri and from thence upward through the anterior portion of the internal capsule to end in the

posterior portion of the second temporal convolutions (vertigo centers). It is through this tract that stimuli from the static labyrinth reach the cerebral cortex and cause vertigo. The tract for past-pointing starts in the prerolandic centers and passes downward through the posterior portion of the internal capsule to the pons. In the pons certain of these fibers cross to the dentate nucleus of the opposite side, whence they pass to the cerebellar cortical centers. From these centers fibers pass back to the dentate nucleus and from there to the pons, then down on the same side to join the crossed pyramidal fibers. The tract cerebral cortex-pons-cerebellum-pons-

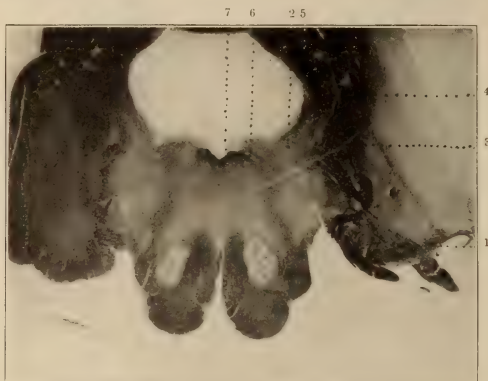


Fig. 6.—Transverse section through the medulla at a higher level than section shown in Fig. 5. The ramus vestibularis is here seen in its entirety (1). The chief mass of fibers is directed toward the small cell triangular vestibular nucleus (2), while a second part curves toward the large cells of Deiters' nucleus (3). Some of the fibers of the vestibular, together with fibers from Deiters' nucleus, take the dorsal course of the restiforme fibers (4), some reaching the small cell nucleus angularis (5), and others passing to the three cerebellar nuclei. A bit of the facial nucleus is seen, the fibers of which surround the nucleus of the abducens (6), after which they form the ascending arm of the facial. This is situated just dorsal to the fasciculus longitudinalis posterior (7).

medulla-brachial plexus, etc., is called the accuracy tract. The other fibers from the cerebral cortex accompanying the accuracy tract pass down through the pons of the same side to decussate in the medulla and pass to the brachial plexus, etc. This is the pyramidal tract proper.

From the above it is readily understood how stimulation of the static labyrinth causes, on the one hand, the slow component of nystagmus known as the eye-pull, and, on the other hand, vertigo. Past-pointing after labyrinth stimulation is probably the result of vertigo alone (Jones). The individual being told to touch the finger of the examiner and perceiving the sensation of turning, reaches

back to find the mark. Because of the fact that he is really not turning, his effort results in pointing past the finger. The act is a subconscious one. When the knee of the patient is touched by himself, no past-pointing occurs because his knee is "turning" with him. The rapid component of nystagmus is due either to stimuli originating in the cerebral cortex or in some subcortical supranuclear center. Animal experimentation points to a supranuclear center, while certain clinical experiences point to the cerebral cortex

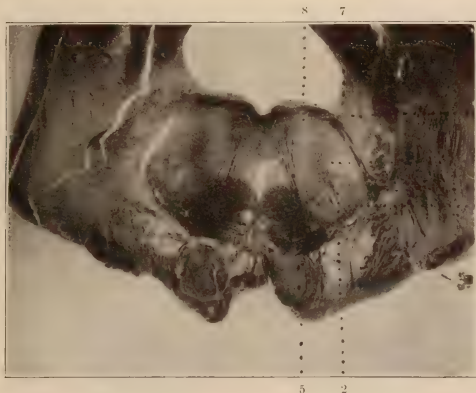


Fig. 7.—Transverse section through the beginning of the pons, showing the continuation of the acoustic fibers. In the tegmental region is seen a bundle of fibers, which originate in the region of the ventral cochlearis nucleus, anteriorly winding around the spinal trigeminus root and then curving in a bow toward the median line, where they cross. This bundle, which in animals with a shorter pons lies exposed on the surface, is the corpus trapezoides (1). In its lateral third is buried the superior olive (2). From the corpus trapezoides radial bundles extend into the olive anteriorly, while dorsally the so-called pedicle fibers (3) enter. These dorsal fibers are the continuations of the striae acusticae. In the corpus trapezoides small cell nests form the trapezoid nucleus. The superior olive lies in close relation to the facial (4) and abducens (5). The nucleus of the fascial lies dorso-laterally, the trunk passing to the lateral side of the olive. The abducens passes through the tegmentum median to the olive. In this section are also seen remains of the large (6) and small (7) cell vestibular nuclei. Small cells just posterior to the cells of Deiters belong to the nucleus angularis. At (8) is seen the nucleus of the abducens.

as the seat of origin of the rapid component. Nausea and vomiting which follow stimulation of the static labyrinth result from stimuli passing from the vestibular nuclei to the nuclei of the tenth.

TECHNIC.

The Bárány-Jones technic must be mastered before one's findings are of any value neurologically, as the slightest technical error may render the tests absolutely worthless. Aside from the discovery of the two separate tracts from the canals and the explanation of past-pointing after stimulation, probably the greatest con-

tribution of the Philadelphia school has been the systematizing of the Bárány tests. In their chart are first noted spontaneous phenomena—nystagmus looking in different directions, pointing, vertigo, falling, Romberg, turning head to right and to left, goniometer, and attempt to overthrow. In observing spontaneous nystagmus, the patient is told to look to the right, then to left, then upward, and finally downward. The type of nystagmus, amplitude, direction, and position of eyes when observed, are all noted. In observing pointing, the examiner first stands in front of patient with index finger held firmly with the other hand. The patient is told to point with index finger and touch examiner's finger with

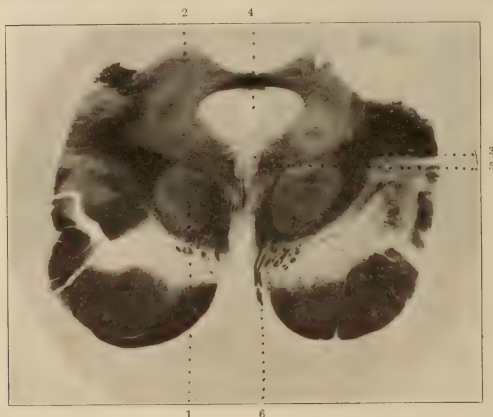


Fig. 8.—Transverse section through the crura cerebri, showing the red nucleus (1) and the superior portion of the corpus quadrigemina (2). At 3 is the oculomotor nucleus. This nucleus consists of several distinct groups of cells lying on the floor of the aqueduct (4) close to the middle line. It is just dorsal to the posterior longitudinal fasciculus (5). Anteriorly are seen fibers of the oculomotor nerve (6).

eyes closed after the arm has been placed in the touching position by the examiner. First the arm with movement from above is tested; then the forearm is tested by having the elbow either rest upon the chair arm or pressed against body; next the wrist is tested by having the hand hang over the back of a chair; next the arm is moved from in front to the side and then from side to front. Pointing may also be tried with legs, head, and trunk, but this is not necessary in routine work. When a normal individual in the Romberg position is gently pushed to either side, forward or backward, he preserves his equilibrium by bending at the waist line. If he falls over like a pole, with no bending, the abnormality is noted.

The goniometer is an apparatus for observing latent tendency to falling, and consists of a platform which can be raised at one end. The patient stands on the platform and tries to compensate, as the platform is raised, by inclining his body toward the rising end. This test is of little practical value, and is therefore rarely used. The Romberg test needs no explanation. If there is spontaneous vestibular nystagmus, turning head to right or left will influence the direction of falling. In the turning test, turning must be done in a chair with a brake, which not only stops the chair, but holds it absolutely still. Any movement of the chair during past-pointing renders the test almost worthless. The patient's head is inclined and retained with a rest 30° forward so as to bring the horizontal canals into the horizontal plane. The chair is then turned to the right ten times in twenty seconds. On stopping, nystagmus is observed as to amplitude and duration. A stop-watch is indispensable for this purpose. The normal nystagmus lasts twenty-six seconds, and is horizontal and of good amplitude. Next the patient is turned in the opposite direction, and the nystagmus on stopping is observed. Following this, turning is done with eyes remaining closed. On stopping, the past-pointing test is made with arm movement from above. Normally it takes three movements of each arm from above to finally come back to touch—that is, for the patient to find the examiner's finger. The distance of past-pointing with the different movements is called off and noted by an assistant. After turning in both directions for past-pointing, vertigo is next measured. It must be understood that the extent of testing at one visit depends on the patient. Some can stand all the turning tests, and even the douching; others can go no further than one turning. To measure vertigo, the patient is turned with eyes closed, and instructed to say "right-right-right" or "left-left-left" as long as he feels that he is turning in a certain direction, and "still" when he feels that he is not moving. When the endolymph catches up with the canal, the patient will say "still." At this moment the chair is stopped and the stop-watch is started and continued until the patient again says "still" (after stopping, patient feels that he is turning in the opposite direction). This test will show, normally, fifteen to twenty seconds of vertigo. This test, like the other turning tests, must be made in both directions. The next test is the caloric. The right ear is douched first, with head 30° forward. In this position the vertical canals are stimulated. Water at a temperature of 68° is used in routine examination, although hot water may be employed in certain cases. The hot water will cause the endolymph to rise, the cold water resulting in a flow in the opposite direction. Before the ear is douched it should be inspected so as to exclude a cerumen impaction or any other obstruction which would prevent the cold water from reaching the part to be af-

fect. Normally there occurs, after forty seconds of douching, a rotary nystagmus to the opposite side. The exact time required to produce the first sign of nystagmus is noted; the douching is then continued until the nystagmus becomes marked. With the eyes closed, the pointing tests are made. Next the head is placed 60° backward and the horizontal nystagmus observed; then with eyes closed the pointing tests are again made. The other ear is tested in the same way. The nystagmus as well as the distance of past-pointing is normally greater for the horizontal canals than for the verticals. This is due to the fact that the horizontal canals are larger and the possible range of ocular movement much greater with horizontal than with rotary nystagmus. In addition to the

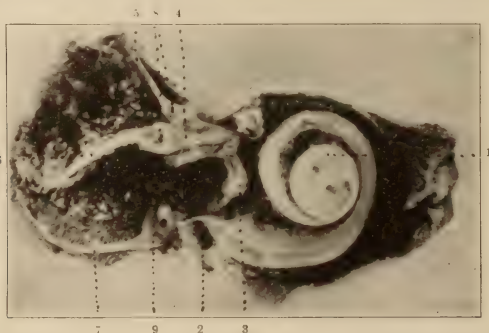


Fig. 9.—Membranous labyrinth of the right side prepared from a normal temporal bone. Anteriorly is the cochlea (1). At the beginning of its basal turn is the fenestra rotunda (2). Just above and anterior to the round window is the sacculus (3). Communicating with the sacculus superiorly and to its posterior side is the utricle (4). Posteriorly are seen the three semicircular canals; above the anterior vertical (5), in the center, the horizontal (6); below, the posterior vertical (7). The ampullæ (8) of the anterior vertical and horizontal canals are seen together superiorly. Inferiorly, in the region of the round window, is the ampulla (9) of the posterior vertical canal.

nystagmus and past-pointing, there must be noted the degree of vertigo and the falling from rotary nystagmus. After the tests have been completed they are studied in connection with the tests of the cochlear division of the eighth.

There are many practical points in connection with this work, which must be considered. First of all, how many of these tests can a patient tolerate at one visit. Pathologic cases, as a class, can stand the tests far better than the normal for the very obvious reason that in the normal there is no blocking of pathways, stimuli passing through everywhere.

A normal individual usually tolerates turning in both directions for horizontal nystagmus and in both directions for past-pointing with head 30° forward. Some will even permit further turning in

both directions for the quantitative test for vertigo. About this time, or even before, the tracts between the vestibular nuclei and the tenth nuclei have conducted stimuli to the latter with resulting unpleasant sensations in the region of the stomach, or even marked nausea and vomiting. The reason for the tolerance to turning with head 30° forward is that in this position the sensation of vertigo is that of turning on oneself as the axis, a safe movement to which all are accustomed. When turning is done with head 120° forward (position for stimulating the vertical canals in the frontal plane), the resulting vertigo, when patient sits up, is that of falling to the side (actual falling is in the opposite direction and is probably compensatory as is past-pointing). This being an unusual and dangerous movement, the sensation is very unpleasant and much more likely to be accompanied by nausea. Turning in this position is not done as a part of routine examination. It is a mistake to attempt more at one visit than the patient can easily tolerate, as such a procedure may cause him to refuse further testing. It is the writer's custom to stop short of any irritation of the tenth nuclei when possible. After the turning tests have been completed in one or two visits, one ear may be douched at the next visit. Although it is desirable to get a marked caloric reaction before testing the past-pointing, it is only by a few unhappy experiences that one learns when to stop so as not to have the patient go to pieces, as it were. One should always have hot water in one irrigating vessel and cold in the other. After douching with cold water, an unpleasant vertigo accompanied by nausea may be relieved by irrigating the same ear with hot water. This stops the movement of endolymph. The hot irrigation must, of course, be stopped before a flow starts in the other direction. If there is doubt as to the patient's returning, the cerebellar hemispheres may both be tested after douching of one ear by getting the results with head 30° forward and 60° backward, then 120° forward. The past-pointing in the latter case will be the opposite to that resulting with head in the other positions. If, after douching the vertical canals, there is no reaction, the patient should be turned with head forward, thereby producing a much more powerful stimulus.

VERTIGO.

It has been stated that vertigo regardless of primary cause is ultimately the result of a disturbance of the vestibular apparatus, and that for this reason all such cases should be examined neurotologically. Investigation has shown that vertigo may be due to the action of toxins upon the vertigo centers in the temporal lobes. In many cases of toxic absorption the effect is directly upon the aural labyrinth or upon the eighth nerve. Theoretically we may

presuppose a toxic vertigo from irritation of any part of the vestibular apparatus. Organic involvement of the labyrinth, eighth nerve, medulla, pons, cerebellar peduncles, cerebellum, etc., may cause vertigo.

There are a certain number of vertigo cases encountered which show no abnormality as far as the Bárány tests are concerned;

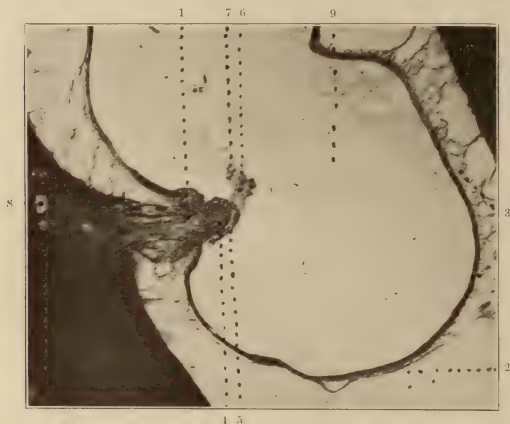


Fig. 10.—Transverse section through the ampullary end of a semicircular canal, showing crista ampullaris (1). It is seen that the membranous ampulla almost fills the cavity of the osseous (2), whereas the membranous canal elsewhere occupies only about one-fifth of the osseous. The membranous ampulla is attached to the osseous by means of numerous bands of connective tissue (3), which serve for the passage of blood vessels as well as for the support of the ampulla. The crista acustica is composed of, first, a loose connective tissue basis, through which pass the fibers of the nervus utriculoampullaris. Resting upon this is a more compact layer of connective tissue, the membrana propria (4). Above the membrana propria is a layer of endothelial cells (5), the center ones of which carry the long hairs which form the cupola (6). These hairs are held together at their ends by means of a homogeneous semisolid substance (7). To the left of the ampulla are seen fibers of the nervus utriculoampullaris on cross section (8). The membranous canal (9) is filled with endolymph, the surrounding space containing perilymph. The endothelial cells extend further down on one side of the crista than on the other. This probably explains why a greater stimulation results from a flow of endolymph in one direction than in the other.

these cases we are forced to call psychic, or, better still, inexplicable at the present time.

LOCALIZATION.

If hearing is normal with both ears and the horizontal canals react normally, we believe the labyrinths to be normal. If in such a case both sets of verticals fail to react, the lesion is usually a fourth ventricular affair (internal hydrocephalus or tumor), or a central cerebellar lesion pressing forward on the posterior aspect of the pons. This is due to the fact that the vertical canals fibers ap-

proach the median line very near the floor of the fourth ventricle. If one set of vertical canals does not react and everything else is normal, the lesion is usually in the upper half of the pons on the side of the nonreacting canals. Sometimes the only proof of the fact that the canals themselves are functioning and that the lesion is central is that nausea occurs without nystagmus, vertigo, or past-pointing. If, after stimulation of one set of verticals, nystagmus occurs without vertigo or past-pointing, the lesion is to be localized in the brachium pontis of the same side. Absence of nystagmus, with presence of vertigo and past-pointing, would mean an involvement of the median portion of the upper half of the pons. Absence of horizontal canal reaction in the presence of vertical canals reaction is rare, but has been observed and must be due to a lesion in the medulla involving only the horizontal canal fibers. If horizontal canal stimulation gives nystagmus, but no vertigo and past-pointing, the lesion is in the inferior cerebellar peduncle. Vertigo and past-pointing, with no nystagmus, would mean a more median involvement of the horizontal fibers, as they pass toward the fasciculus in the medulla. Loss of reaction from both horizontal canals would mean an extensive lesion in the medulla, which would involve also the fibers from the vertical canals. Normal nystagmus from stimulation of all canals on one side, in the absence of vertigo and past-pointing, would mean an involvement of the cerebellum on that side. Absence of vertigo and of past-pointing with both arms after turning with head 30° forward and then with head 120° forward would mean either a bilateral cerebellar involvement, or more probably an involvement of the decussation of the superior cerebellar peduncles. The presence of vertigo in the absence of past-pointing after turning would speak for a bilateral cortical involvement of the cerebellum, or more probably of a lesion in the pons, involving the decussation of the accuracy tract fibers. It is very important to determine with certainty whether the patient is perceiving a true vertigo. Frequently an unpleasant sensation of confusion is mistaken by the patient for a sensation of turning, which is true vertigo. Vertigo after turning, in the absence of past-pointing with one arm, speaks for a lesion in the cerebellar hemisphere on the side of no past-pointing.

Spontaneous past-pointing may mean either a lesion in the cerebellar cortex or pressure. The presence after stimulation of past-pointing in the opposite direction to the spontaneous past-pointing proves that the spontaneous phenomenon is the result of pressure. The absence of past-pointing after stimulation proves the presence of an actual lesion. Spontaneous past-pointing outward with wrist, arm, or hip means either a lesion or pressure upon the lobus biventer, in which are situated the wrist, arm, and hip centers for inward movement. The center for outward movement of the

arm is in the lobus semilunaris superior and lobus semilunaris inferior 5 centimeters posterior to auricle and just under the tentorium. The center for downward movement of the arm is posterior to center for outward movement and in the same lobes. Numerous other centers for body movements must exist, but have not yet been localized. The vermis contains centers for control of trunk movements. Spontaneous vertical nystagmus is pathognomonic (Bárány-Jones) of a neuraxial lesion. Spontaneous rotary nystagmus not labyrinthine, is usually due to a lesion in the pons or pressure upon this area. Spontaneous horizontal nystagmus, not labyrinthine, is usually the result of a lesion or pressure upon the medulla. In meningitis we may have nystagmus in all directions. Conjugate deviation of the eyes, either spontaneously or after stimulation of the ears, speaks for an involvement of the fibers coming from the cerebral cortex or supranuclear centers to transmit the rapid component stimuli. Diminished reactions from all canals of one side, with impaired cochlear function, speak for an end-organ lesion. With an end-organ lesion we may have either nystagmus to the same side, or, in the case of a diffuse process, a nystagmus to the opposite side. Spontaneous labyrinth nystagmus lasts no longer than a few weeks, whereas intracranial nystagmus may last indefinitely.

PROGRESS OF BRAIN DISEASE.

Jones and a neurologist had seen a patient together, and had diagnosed disease of the cerebellum. She was sent back to Jones several weeks after the first examination with a letter in which was stated, "Our patient is very much better." Jones examined the patient neurologically and answered, "Our patient is very much worse." The tests had shown with almost mathematical accuracy that the disease had progressed markedly since the first examination.

A patient of the writer, suffering from a cerebellar abscess, complicating a perisinus abscess, gave normal past-pointing with both arms after turning, several months ago. Later, past-pointing was lost on the left (side of involvement). At present there is no past-pointing with either arm. The vertical canals on the affected side have ceased to react and the horizontal canal shows diminished reaction. The charts show in a most definite manner the progress of the cerebellar abscess, which has not only disturbed the function of the left cerebellar hemisphere, but has through pressure interfered with the function of the right hemisphere and the left side of pons and medulla.

PREVENTION OF UNNECESSARY BRAIN OPERATIONS.

So valuable are the neurologic tests that no brain surgeon should even consider a surgical procedure until the patient has had the benefit of the Bárány-Jones examination. The writer recently

examined a patient with definite symptoms of a lesion of the cerebral cortex whose case became inoperable after the tests showed, in addition, a lesion in the neuraxis.

The subject is so interesting and so large that there is an almost irresistible temptation to go on and on, but the writer must close with the hope that what has been written will serve, first of all, to call attention to the invaluable contribution to otology by Isaac Jones and his associates, and, secondly, to demonstrate the importance of this new work to medicine in general and neurology in particular.

The report of neurotologic and otoneurologic cases, the writer is reserving for another paper.*

VESTIBULAR CHART (JONES)—NORMAL.

Name.....	Date.....
Address.....	
Referred by.....	
Chief complaint:.....	Age.....
Diagnosis:.....	

		Spontaneous.		Voluntary.	
Nystagmus.				Right.	Left.
Looking to right, O.		Shoulder	from above	T	T
Looking to left, O.		Shoulder	from below	T	T
Looking up, O.		Shoulder	from side	T	T
Looking down, O.		Elbow	from above	T	T
Looking forward, O.		Wrist	from above	T	T
Romberg, neg.				{ Nystagmus, O.	
Turning head to right, O.		{ Summary..		{ Vertigo, O.	
Turning head to left, O.				{ Past-pointing, O.	
Attempt to overthrow, normal bending.				{ Falling, O.	

TURNING.

To right.	To right.		
Amp., good.	Shoulder from above,	30 to R.	24 to R.
Duration, 26 seconds.		12 to R.	6 to R.
→		T	T
	Summary..	{ Nystagmus, normal.	
		{ Vertigo, 20 seconds.	
		{ Past-pointing, normal.	
To left.	To left.		
Amp., good.	Shoulder from above,	24 to L.	24 to L.
Duration, 26 seconds.		12 to L.	6 to L.
←		T	T
	Summary..	{ Nystagmus, normal.	
		{ Vertigo, 20 seconds.	
		{ Past-pointing, normal.	

CALORIC.

Douche right.	Douche right.		
Amp., good.	Shoulder from above,	12 to R.	6 to R.
After minutes, 40 seconds.			
Rotary nystagmus to left.	Summary..	{ Nystagmus, normal. { Vertigo, normal. { Past-pointing, normal. { Falling, to right. 24 to R. 20 to R.	
Head Back→Amp. good.			
Douche left.	Douche left.		
Amp., good.	Shoulder from above,	12 to L.	6 to L.
After minutes, 40 seconds.			
Rotary nystagmus to right.	Summary..	{ Nystagmus, normal. { Vertigo, normal. { Past-pointing, normal. { Falling, to left. 24 to L. 24 to L.	
Head Back←Amp. good.			

SOME OF THE PRINCIPLES INVOLVED IN THE TREATMENT OF PATIENTS SUFFERING FROM OBSTRUCTING ENLARGEMENT OF THE PROSTATE.¹

By E. STARR JUDD, M. D., Rochester, Minn.

The so-called adenomatous hypertrophy in the prostate which occurs in men past middle life has been shown by Tandler and Zuckerkandl to be a definite neoplasm or series of neoplasms held together by fibrous tissue. The process is very similar to that which occurs in the thyroid as multiple adenomas. The adenomas in the prostate compress the glandular and fibrous tissue into a definite, firm capsule, and it is the pressure of these tumors within the gland that gives rise to symptoms of obstruction. To relieve these symptoms, the new growths must be removed from the gland. Prostatectomy usually consists, not in the removal of the entire gland, but in the enucleation of the new growths, the firm capsule being left intact.

Frequency of Occurrence.—According to most investigators, adenomatous hypertrophy of the prostate occurs in about 60 percent of all men more than 50 years of age, though it is said only about 34 percent of these men have symptoms which require treatment. It is our custom to make routine examinations of all patients, and it has been of interest to review some of the records of examinations of the prostate. I have recently gone over the histories of 100 consecutive cases of men more than 50 years of age who were admitted to the clinic with general complaints other than genitourinary. The rectal examination showed a palpable enlargement of the prostate in every case. Sixty-five of these men were between the ages of 50 and 60 years, 14 between 61 and 65, 9 between 66 and 70, 7 between 71 and 75, 5 between 76 and 80. On a basis of 1, 2, 3, and 4, 44 had a relative enlargement of 1 (i. e., though slight, it was easily recognized); 41, an enlargement of 2; 8, an enlargement of 2+; and 7, an enlargement of 3. In this series it was not possible to determine any definite relation between the enlargement and the age of the patient. The analysis of the urine in 59 of the 100 cases was negative; 36 showed pus; in 19 there was a history of Neisserian infection. It is probable that in some of these the enlargement of the gland was inflammatory. In 5 cases the urine contained casts. While none of these men came for treatment because of urinary symptoms, it will be noticed that a large percentage had some evidence of trouble from prostatic enlarge-

¹Presented before the Iowa and Illinois Central District Medical Association, Davenport, Iowa, July 13, 1916.

ment. Thirty-six had nocturia; 17 were obliged to get up on an average of once each night, and 19 two or more times each night. Forty-two had no evidence of trouble from the enlargement; 14 complained of some difficulty in starting the stream and of frequency in cold weather; a few complained of dribbling.

While this series of 100 cases is not large enough to be conclusive, it is suggestive. In our opinion this condition of the prostate is almost universal in men past 50 years of age. In some instances there were no symptoms with large lesions, but we know that most marked symptoms may be produced by comparatively small growths.

Symptoms and Diagnosis.—Usually the first symptoms produced by enlargement of the prostate are frequency of urination, irritability of the bladder, and slow stream often difficult to start. Occasionally there is acute retention of urine very soon after the first signs of trouble, but more often retention occurs after the ordinary symptoms of partial obstruction have existed for a long time. The process is almost always gradual. Often frequency and irritability exist for some time before the person becomes aware that he is not completely emptying his bladder, and it may be several years before the symptoms are severe enough to cause him to seek relief. Most of these patients have given a history of some obstruction for from two to ten years. The primary symptoms are produced by the growth in the gland. The secondary symptoms result from back-pressure of residual urine, which may cause changes in the bladder, ureters, and kidneys. Infection undoubtedly is an important factor in producing these secondary symptoms. Frequency and burning, the first indications of irritability of the bladder, are caused by the encroaching of the enlargement on the prostatic urethra and its extension into the bladder. If all patients could be operated upon and the obstruction removed at the time of these primary symptoms and before any of the secondary changes take place, I believe the operation could be performed with practically no mortality and with an easy convalescence. With the gradual increase in the growth of the gland, there is usually an increase in the amount of residual urine. The problem becomes serious when the point is reached at which the amount always remaining in the bladder is from 8 to 10 ounces. The effect of residual urine has never been definitely shown, but there is no doubt that its complete and permanent removal is often very serious and sometimes fatal. It was this feature which years ago caused the high mortality following prostatectomy. In performing the operation upon persons who for a number of months or years had had several ounces of residual urine, we removed the urine as well as the obstruction. Of course in the absence of obstruction the urine did not again accumulate, and a large number of these patients became uremic and died. We have

long known that a patient who has been catheterizing himself for some time is a much better risk for prostatectomy than one who has not. It is hard to say just why patients become uremic on withdrawal of the residual urine. Necropsies upon patients who have died under these circumstances have almost invariably shown the cause of death to be an acute nephritis superimposed on the chronic condition. It would seem that the most feasible explanation of what takes place is this: During the time the obstructive process has been developing, the amount of residual urine has been relatively increasing and there has been a back-pressure into the bladder, which sometimes dilates the ureters and extends up into the pelves of the kidneys. This pressure has increased so gradually that the patient has become accustomed to it. In some instances there are apparently no organisms in the urine, though the infection probably exists in the tissues at the time. Removing the obstruction takes away all the back-pressure. In all probability this would not be serious as far as the bladder and ureters are concerned, but in the pelves of the kidneys it makes almost a negative pressure, so that the blood vessels and the tissues of the kidneys which have been compressed in this way are now released and much more blood comes into the latter than was there formerly. In this manner congestion of the kidneys is produced, which, when severe, results in acute nephritis.

Another theory is that during the time the residual urine is in the bladder there may be some absorption from it into the general circulation. Accordingly, when the residual urine is withdrawn, absorption ceases. I have tried to counteract this effect by giving several urinary constituents to patients who showed symptoms of reaction after the withdrawal of the residual urine, but their condition was not relieved. This latter theory was suggested by the fact that often in the reaction following the removal of residual urine, patients present many of the characteristics of morphin addicts who are denied morphin. While there is considerable question as to just what this reaction is, there is absolutely no doubt that it exists, and it is almost certain to occur when the residual urine is withdrawn.

Does it not seem that these facts definitely indicate that in any case in which there is enlargement of the prostate and a considerable amount of residual urine, the treatment should be divided into two stages? In the first stage the residual urine should be withdrawn gradually and infection of the bladder cleared up as far as possible. The first stage of the treatment is always followed by some reaction. Usually there will be some general depression, loss of appetite, restlessness, and nervousness. The best index to the reaction is the specific gravity of the urine, which is always much lower during this stage of depression. Practically every patient has a period

of depression, and it is noteworthy that the specific gravity of the urine and other findings correspond very closely to his general condition. In reviewing the preparatory stages of 50 prostatectomies, we found that the course was identical without exception. In all there was a sudden drop in the specific gravity, accompanied by malaise, loss of appetite, vomiting, irritability, and sometimes uremia. This first stage usually lasts from three days to two weeks, and is followed by a slow, gradual rise in the specific gravity and gradual improvement in the general health. General irritability disappears and appetite returns. The patient feels better than he has for years. During the preparatory treatment there is always a fall in blood pressure; it is not uncommon to see it come down 30 to 40 points in two or three weeks.

We prefer to prepare patients for prostatectomy by using a urethral catheter. If they have not previously used one, and if there is no sign of a uremic tendency at the start, we begin by catheterizing two or three times in twenty-four hours. If there is a uremic tendency at the beginning, the catheter should be used very cautiously. When a patient becomes accustomed to the instrument, a soft permanent catheter is fastened in by adhesive strips on the penis. With ordinary cleanliness and occasional change, drainage may be continued in this manner for a number of weeks. In cases in which the catheter gives trouble, and in feeble uremic patients with a large amount of retention, suprapubic drainage should be done. As soon as the reaction from the preparatory treatment has subsided, a prostatectomy may be performed with comparative safety. It is obvious that to operate without preparatory treatment brings the period of depression in the first few days after the operation—the time of greatest danger from the operative work. If the patient has weathered the period of depression beforehand, he has little or no reaction at the time of the second stage of the treatment—i. e., the removal of the enlargement.

The result of the examination of the first specimen of urine may be very deceiving, especially if the urine was passed in the office. Very often the specific gravity is high, and represents the patient's condition as being much better than it really is. If he has been using a catheter, the specific gravity ordinarily will not be so high. To illustrate, a specimen of urine passed in the office showed a specific gravity of 1025. The patient had 10 ounces of residual urine and had not used a catheter. Subsequently he was catheterized once a day for four or five days. At the end of that period a twenty-four-hour specimen showed a specific gravity of 1015, and the patient was feeling fairly well. He was then catheterized two or three times a day for four or five days and the specific gravity dropped to 1009. In the meantime he had become restless, was not sleeping well, and his appetite was poor. This reaction ex-

tended over a period of nearly a week, during which catheterization was done cautiously, and with the idea of discontinuing it entirely should there be evidence of more severe reaction. At the end of seven days (two weeks from the beginning of treatment), however, the symptoms were subsiding, the patient's appetite was returning, and he rested better at night; the specific gravity of his urine had risen from 1009 to 1014. The reaction having subsided, it was possible to leave the catheter in the bladder almost continuously and to keep the bladder practically empty. The patient continued to improve, and very soon he stated that he was feeling better than he had in months past. The specific gravity of his urine never returned to what it was at the time of the first examination (1025). The high specific gravity at that time could doubtless be explained by the possible concentration of the residual urine.

This case illustrates the reaction that is observed in almost every one of these patients while they are being rid of the residual urine. We have occasionally seen a patient who suffered no reaction in spite of the fact that there was considerable residual urine; on the other hand, we have seen patients with a small amount of residual urine who have had a very severe reaction during this preparatory treatment. Although it is probable that infection plays a rather important part in causing the reaction, we have been unable to demonstrate it. Patients whose urine shows no evidence of infection, either at the beginning of or at any time during the treatment frequently seem to be the ones who have the more severe reaction.

The following table shows that in 50 cases the average specific gravity at the first catheterization was 1016 while at the time of greatest depression it was 1006. Therefore, in the average case, it dropped ten points from the beginning of preparation to the height of depression. The figures indicate that the average specific gravity at the time of operation was 1011, a rise of five points from the time of greatest reaction. In many instances the preparation was continued over a number of weeks until all the evidence of reaction had disappeared. In a very few instances we observed a return of the specific gravity to what it was at the time of the first catheterization, in spite of considerable improvement in the patient's general condition compared with what it had been four months previously. .

VARYING SPECIFIC GRAVITY AND BLOOD PRESSURE DURING
PREPARATORY TREATMENT—50 CASES.

	High	Low	Average
Specific gravity at first catheterization	1025	1006	1016
Specific gravity at greatest depression	1013	1001	1006
Specific gravity at operation	1021	1004	1011
Blood pressure at first catheterization	230	140	166
Blood pressure at operation	190	110	145
Functional test at operation, in percentages.....	60	12½	40

The change in the blood pressure during the period of preparation would seem also to indicate a change in renal function during this period. Apparently patients with a high systolic pressure will stand operation well, but, if the diastolic pressure is high, especially if it is out of proportion to the systolic, their chance of withstanding surgical procedure is not nearly so good. The average systolic pressure in these 50 cases was 166; during preparatory treatment this average dropped 21 points, so that it was only 145. A part of this change may be attributed possibly to the loss of appetite and lessened activity. However, in spite of the fact that the patients returned to a normal diet and free exercise, the blood pressure did not return to its former high point.

The phenolsulphonaphthalein test of the function of the kidney averaged 40 percent, which, in our experience, is a safe limit in these cases. The highest functional result was 60 percent and the lowest was 12.5 percent. Of course the risk would be great in operating on a patient whose return was only 12.5 percent unless everything else was favorable. The functional test is very important in determining the operability. It must be, however, borne in mind that an infected kidney may show a high return, and for that reason a good output does not necessarily mean a safe operation, though a low test would indicate considerable risk in operating.

Data in regard to the specific gravity of the urine of 25 patients under preparation showed that at the beginning of their treatment the average specific gravity was 1015. After eight or nine days of preparation it dropped to 1004, and, although preparation was continued for nine weeks, it never again became more than 1009. At this point, however, the patients were considered good risks for prostatectomy.

In conclusion I would state that preparatory treatment is of the greatest importance in all bladder and prostate cases. Preparation should be accomplished by urethral catheterization as far as possible. If this procedure does not accomplish the desired results, it will be necessary to institute suprapubic drainage, and then wait until the reaction subsides before attempting prostatectomy. Sometimes it has seemed that the reaction subsided a little more quickly with suprapubic drainage than with urethral catheterization. Suprapubic drainage has, however, the added danger of infection and very severe reaction. The two-stage treatment described will considerably reduce the mortality.

STEREOSCOPIC LOCALIZATION OF BULLET IN SPINAL CANAL.

By PHILIP H. COOK, M. D., Worcester, Mass.

Roentgenologist, Worcester City and Memorial Hospitals; Physician to Out-Patients, City Hospital.

This case is reported to demonstrate the advantage of the roentgen-stereoscopic method in locating foreign bodies in the deeper parts. Particularly about the spinal column is a minimum of operative trauma and manipulation desirable.

On July 4, 1916, a crowd of boys set out to hunt mud turtles on



Stereoscopic localization of bullet in spinal canal.

the shore of a pond in the outskirts of the city of Worcester. One of them had a 22-caliber revolver. In some unknown way the piece was discharged, and the bullet struck the patient, a boy of 14, in the back. Complete paralysis below the injury at once supervened. The boy was carried by his companions about a quarter of a mile, to the nearest point where aid could be obtained, and thence was taken to City Hospital.

Physical examination on entrance showed a well-developed boy, conscious and rational. Head presented no abnormalities. Over fourth dorsal vertebra in median line of back was the small wound of entrance. Below the second rib was complete loss of sensation, tactile and temperature. Motor power was completely lost. Muscles flaccid. Reflexes absent. There was no expansion of chest save that due to action of diaphragm. Heart, lungs, abdomen, and extremities negative. Urine was retained; bowels moved involuntarily.

Roentgen examination on morning of July 5 showed the bullet lying in the spinal canal, point downward, at about the level of the last cervical vertebra. The accompanying illustration, examined with a pocket stereoscope, shows the position of the projectile relatively to the other structures.

Operation was at once performed by Dr. Homer Gage. An incision 5 inches long was carried upward from wound of entrance. Laminæ of last two cervical and first two dorsal vertebræ were removed. Canal opened and bullet found at level of last cervical vertebra. The bullet was imbedded in the cord. There was no hemorrhage in cord or sheath. Evidently the bullet had entered at level of fourth dorsal and traveled upward in the cord to the point where it was found.

The patient made a good ether recovery, but showed no improvement in symptoms. Next day he became delirious and unconscious, with rising temperature, which continued until death occurred at 4:50 p. m. on July 7.

In commenting on the case, Dr. Gage called attention to the difficulties arising from the yielding character of the cord tissue and the limited working space. The bullet, lying point downward, sprang away from the extracting forceps, and migrated some distance before it could be successfully grasped.

THE CORRELATION OF CLINICAL AND ROENTGEN DATA IN THE DIAGNOSIS OF GASTROINTESTINAL LESIONS.¹

By J. A. MATLACK, M. D., Galesburg, Ill.

In endeavoring to arrive at a correct diagnosis in any given class of cases, it is essential that the diagnostician make use of every method or appliance of proved value. No strict adherence to any one method, or blind prejudice against another, should be assumed. Where several methods may be used in obtaining similar information, one should be used to supplement or check up the others.

In the diagnosis of gastrointestinal lesions there has been, and is still, a disposition in some quarters to raise a controversy as to the relative merits of clinical and roentgen ray diagnosis. This discussion is fostered on the one hand by clinicians who like to contend that by the old methods of careful history-taking, physical examination, and laboratory findings all possible information may be obtained in gastrointestinal diagnosis, and on the other hand by certain overenthusiastic x-ray workers who would make it appear that their methods of gastrointestinal diagnosis have become so perfect that all other methods are superfluous, or at least merely preliminary and of minor importance.

The real truth lies somewhere between the extreme views of these partisans, each boosting his own methods. The attitude of the gastroenterologist, too bigoted to acknowledge the help he may receive from the x-ray, is no more reprehensible than that of the roentgenologist who advances his claims to 100 percent efficiency in the diagnosis of lesions of the stomach, gallbladder, appendix, colon, and small intestine. Claims to perfection are always viewed with suspicion, and controversies are the natural result of extravagant claims and of unjust depreciation of the accomplishments of other workers.

Turning, then, to the consideration of each separate section of the gastrointestinal tract, we find that the portions most accessible to direct visual and tactile examination by the clinician, the beginning of the tract and the termination thereof, rarely present problems of extreme difficulty in diagnosis, and the clinician is therefore less in need of roentgenologic confirmation of his findings. Going further into the interior, and considering the stomach and the large intestine, direct examination by the clinician is practically impossible, and the roentgenologic data are of very considerable value—

¹Read before the annual meeting of the Des Moines (Iowa) County Medical Society, December 13, 1916.

in fact, practically indispensable. Between these two areas of easy access to either the visual instruments of the clinician or the opaque solutions of the roentgenologist lies the small intestine, characterized by C. H. Mayo as "several yards of bowel left as an unclaimed field—not only unclaimed, but unwanted," by either the internist, roentgenologist, or the surgeon.

Lesions of the esophagus are, as a rule, readily diagnosed clinically, provided the clinician has a large experience with this particular class of lesions, and has the necessary appliances at hand for direct examination. A history of dysphagia naturally suggests an obstructive lesion of the esophagus, and a careful consideration of the details of the history, together with a skillful application of the various mechanical means of investigation, will usually give fairly complete information as to the nature of the lesion. However, the roentgen examination, while possibly not essential in many cases, is yet extremely useful in confirming and amplifying the information already at hand. A diverticulum may be readily diagnosed clinically, but its size, shape, and exact situation may be uncertain until shown graphically on the roentgen plate. Likewise, the clinician, in dealing with an obstruction at or above the cardiac orifice of the stomach, may be satisfied in his own mind as to the nature of the lesion, but it is certainly helpful to him to see on the plate either the irregular shadow with moderate dilatation above, characteristic of cancer, or the smooth outline and great distention characteristic of cardiospasm.

Lesions of the stomach are diagnosed clinically by the history, the physical examination, and the laboratory findings. Of these methods, chemical analysis of the gastric contents is notoriously unreliable, and physical examination is practically limited to the elicitation of tender areas and the discovery of palpable growths, so that the clinician is often practically limited to the story of his patient for the attainment of diagnostic information. A history carefully taken by an experienced clinician, and given in correct detail by an intelligent patient, is of great value in diagnosis of lesions of the stomach. The story correctly told by a patient afflicted with gastric or duodenal ulcer, or gastric carcinoma, is frequently so typical of these lesions that any added examination is of secondary importance. It is, however, very hazardous to place unlimited reliance on the anamnesis as detailed by the average patient, for the reason that there is such a varying degree of intelligence, imagination, and sensibility to bodily discomfort. Many patients are prone to exaggeration, others seem deliberately to mislead the examiner, and a great many by lack of descriptive powers fail to give a correct impression.

It is, therefore, highly desirable that methods not dependent on the past or present sensations of the patient be developed and made

use of. While a patient may consciously or unconsciously give a wholly unreliable history of his ailment, he cannot by any voluntary act alter the roentgenologic picture as seen on the fluorescent screen or photographic plate. It is this impersonal quality of the x-ray that renders it so valuable in checking up the clinical findings of the examiner. After consulting several examiners, a patient may gain such a knowledge of cardinal diagnostic points that he will give a beautiful history of a definite gastric lesion, such as ulcer, without in fact having anything of the kind. He cannot, however, delude himself or the examiner to the extent that he can voluntarily cast roentgenologic shadows characteristic of his supposed ailment.

In many cases the stomach is greatly disturbed by reflexes originating in other organs, such as the gallbladder and appendix, and it is frequently impossible for the clinician to decide whether the gastric disturbance is due to intrinsic or extrinsic causes. In such cases, if the stomach and duodenum are normal on x-ray examination, the real cause of disturbance is much more easily located. In other words, the negative findings of the roentgenologist are frequently of as great value as is the positive demonstration of lesions within the stomach.

The clinical diagnosis of ulcers of the stomach and duodenum stood on a fairly firm basis long before the roentgen ray was even thought of as an adjuvant in diagnosing lesions of the gastrointestinal tract, but, with the advent of the new method, much that was formerly conjectural and indefinite may now be determined exactly. The typical clinical picture of gastric or duodenal ulcer can hardly be mistaken, but no clinician can absolutely vouch for the information obtained from his patient, nor can he in the majority of cases say definitely whether the lesion, if present, is on the proximal or distal side of the pyloric ring. What the x-ray does is to confirm or deny the existence of a lesion and in most cases to localize it definitely.

In dealing with malignant growths of the stomach, the clinician, in many cases, may be quite certain of his diagnosis. A patient with a short history of stomach distress, with cachexia and rapid loss of weight, with achlorhydria and food retention and with a palpable mass in the epigastrium, shows a picture so characteristic that further information might seem superfluous. The picture, however, may not be quite so complete. While some of these signs and symptoms may be present, others may be absent, and therefore the direct examination by means of the barium shadow may prove of great value. It is unfair to a patient to subject him to any exploratory operation on a mere suspicion of malignancy when a direct inspection of the barium-filled stomach may suffice to show its contour to be normal, and it is equally reprehensible to explore a practically moribund patient when the roentgen ray is available

to establish the fact of inoperability. Even so definite a finding as the presence of a palpable mass in the abdomen may be insufficient for the establishment of a definite diagnosis. In such cases the examination of the barium-filled stomach or colon will definitely clear up the problem of whether the growth is inside or outside these structures, and whether its removal may safely be undertaken.

The foregoing discussion of the clinician's dependence on the roentgenologist may be supplemented by the converse proposition—that of the dependence of the roentgenologist on the clinician. While no reasonable man would attempt to disregard proved methods of clinical diagnosis, and place his reliance on x-ray evidence alone, many overenthusiastic x-ray workers would give the impression that this course might safely be pursued. Such radical views lead only to resentment and add greatly to the difficulties of conservative roentgenologists who seek the cooperation of the clinician.

Strictly speaking, the roentgenologist should confine his work to the observation of radiographic shadows and to the recording of such shadows as to their size, shape, density, and location. In the rendering visible a hollow viscus by means of opaque media, a strict x-ray interpretation would lie merely in the observation of the shadow cast by such media—whether the viscus receives it in a normal manner and with normally developing contour, or whether a distortion, obstruction, filling defect or other abnormality is demonstrable. If the roentgenologist undertakes to interpret these shadows as pathological entities, he will frequently fall into error, unless he gets clinical information either directly or indirectly from the patient or from the clinical consultant. For instance, the shadow of an irregular filling defect in the midportion of the esophagus usually means carcinoma, but the finding is conclusive only in case the patient shows the clinical picture of malignant disease. A similar shadow in a patient who gives a history of swallowing a caustic solution probably means a benign stricture. An obstruction low in the esophagus, giving a smooth shadow, suggests cardiospasm, and one of irregular outline suggests carcinoma, but it is quite possible for a carcinoma to have a smooth shadow, and a cardiospasm may be complicated by the presence of solid food particles and thus cast a shadow of irregular outline.

A definite deformity of the first portion of the duodenum in the great majority of cases signifies duodenal ulcer, but in the occasional case it may be due to adhesions or other extraneous causes. Consideration of the clinical aspects may be needed to clarify the situation. Likewise a definite filling defect in the stomach or colon usually means carcinoma, but in a small percentage of cases the condition is due to syphilis, extraneous pressure, spasm, or inflammatory conditions. Here, also, clinical information is essential. In

those and similar cases it is impossible to formulate any rule of shadow interpretation which will hold good without many qualifying exceptions, and it is therefore necessary for the roentgenologist to take cognizance of clinical factors if he elects to report lesions instead of confining himself to the description of shadows.

The personality, training, and ability of the examiner must always be considered. The opinion of a good clinician is of much greater value than that of an inexperienced radiologist, and, vice versa, the diagnosis of a well-trained radiologist with a weather eye open for diagnostic pitfalls is more apt to be correct than is that of an incautious clinician. Radiology of the gastrointestinal tract has been brought to its present state of perfection within the past five years, and there are comparatively few men who have attained efficiency in this line of work. The casual x-ray worker may be able to interpret the plain and easy cases, but there are many more cases which require the fine discrimination which is acquired only by long experience with a large amount of material.

The conclusion is this: That the x-ray interpretation of gastrointestinal lesions has been developed on a sure foundation and cannot be ignored by the progressive clinician, and also that, without the help of the clinician, the roentgenologist is more or less at sea in the interpretation of his findings. The correct diagnosis will be arrived at either by the combination of clinician and roentgenologist in the same individual, or else by close and friendly cooperation between the individuals, each with a proper respect for the work of the other.

ROENTGENOGRAPHIC OBSERVATIONS IN BONE METASTASIS FOLLOWING CARCINOMA OF THE PROSTATE.

By W. H. STEWART, M. D., New York City.

At a meeting of the New York Roentgen Society held on May 17, 1916, Dr. Leopold Jaches presented a case of bone metastasis following a primary carcinoma of the prostate. He stated at the time that the changes were so characteristic that he felt justified in making a diagnosis of the primary condition upon the secondary roentgenographic appearance of the bones alone.

At the last meeting of the American Roentgen Ray Society, held in Chicago in the latter part of September, 1916, Dr. D. B. Phemister, of the Presbyterian Hospital, Chicago, Ill., presented a most interesting communication on the subject of bone metastasis. The main point brought out in his paper was that metastasis in bony structure following a primary carcinoma usually assumes the characteristics of the original growth; if the stroma predominated in the primary lesion, we were sure to have a condensing or osteoplastic form of metastasis; if the primary cancer were of a medullary form, we would have a secondary rarifying or osteoclastic process. Roentgenographic experience would bear out this statement, as I am sure that we have all noted that a rarifying bone metastasis usually follows the medullary form of carcinoma of the breast, while in carcinoma of the prostate where the stroma predominates we have the condensing form of secondary involvement; in fact, in the latter case, the metastatic changes are so constant and the roentgenographic appearance so characteristic that we are able, in the vast majority of cases, to diagnose the primary lesion from the roentgenographic findings in the secondary lesions alone.

The osteoplastic form of bone metastasis following a carcinoma of the prostate may involve all of the bones of the body; usually, however, the process is seen most advanced in the bones of the pelvis and in the lower spine. The roentgenographic appearance is one of an increase in density; so much so that all the normal bone markings usually seen are obliterated and replaced by a dense, almost black, shadow.

The following case will, I believe, best bring out the points mentioned above:

W. B.; age 49; nationality, German; occupation, steamfitter. Referred by Dr. O. Schwerdtfeger.

Chief Complaint.—Pain in both lower extremities; duration, eight months.

Family History.—Father died at age of 73 of pneumonia. Mother living and well; age, 72; no brothers. One sister living and well; none dead. Patient married and has three children living and well.

Previous History.—Measles at age of 5; scarlet fever when 4 years old; frequent attacks of tonsillitis up until two years old, when tonsils were removed. Malarial fever ten years ago.

Present History.—Occupation, steamfitter in slaughter house. Has spent over half his time (twenty-six years) working in ice-boxes. Lost 50 pounds in weight during last seven months. Appetite good. Bowels regular. Micturition, gets up once or twice every night. No heart or lung trouble. No nausea



Bone metastasis following carcinoma of the prostate. Roentgenogram showing the condition of the pelvis, lumbar spine, and heads of the femurs.

or vomiting. Has been drinking six glasses of beer daily for past twenty-five years.

History of Present Illness.—November 20, 1916. Patient had a numb pain, starting in the lower extremity on the right side below the knee and, gradually ascending, involving the tissues around the knee-joint. The left leg was next and likewise involved, then the calf and flexor muscles of the thighs, and so upward to the hip-joints. Now has a "drowsy-like" pain, involving each lower extremity from ankles to hips.

General Condition.—Well nourished and developed middle-aged male, showing no acute symptoms. Complains of pain in right lower extremity. A yellowish scaly eruption on the chest. No jaundice.

Physical Examination.—Head—scalp covered with moderate amount of dark hair. Eyes—pupils regular, equal, react well to light and accommodation. Mouth—teeth in very poor condition; tongue coated and dry; left tonsil hypertrophied. Neck—no rigidity; no enlarged thyroid. Chest—expansion good; pain over costosternal region. Lungs—dullness, bronchovesicular breathing, and few fine crepitant rales at right infraclavicular region. Heart—apex in fifth space within the nipple line; no enlargement or murmurs; second sound of poor muscular quality. Liver—dullness in fourth space; edge felt two fingers' breadth below costal margin; hard; not tender. Spleen—distinctly palpable below the costal margin; dull area enlarged; measures $4\frac{1}{2}$ cm. by 6 cm. Abdomen—soft; no masses, fluid, or tenderness. Extremities—knee jerks absent on right leg; diminished on left leg. No shortening of legs. Circumference of calf of right leg $12\frac{1}{4}$ inches; of left leg, $12\frac{3}{4}$ inches; of right thigh, 14 inches; of left thigh, 14 inches. Slight muscular tenderness on palpation. Extreme pain over course of sciatic nerve of both legs. No inflammatory changes in the knees. Pulses—high tension; rapid; regular. No clubbing.

Examination of Urethra.—November 21, 1916. No. 18 French, soft rubber catheter passes freely, with very little force and only slight pain.

Rectal Examination.—November 21, 1916. Very large, very hard prostate. Not much pain on pressure.

Examination of Prostate.—November 21, 1916. Prostate enlarged; would not account for sciatic pain. Right seminal vesicle hard. Dr. Schwerdtfeger.

Bladder Catheterized.—November 22, 1916. 1,100 c.c. urine obtained.

Examination of Prostate.—November 24, 1916. Prostate very much enlarged; hard, presenting irregular surface and number of hard protrusions, suggestive of either calculi or carcinoma. Roentgen examination advised. Dr. Torek.

Examination of Femur by Dr. Torek.—November 27, 1916. Prominence on the posterior aspect of the femur, which, taken in conjunction with the roentgenographic findings, makes the diagnosis of carcinoma of the prostate with metastasis certain. No surgical interference recommended.

December 1, 1916.—Must be catheterized every twelve hours. Considerable pain over bones of pelvis and femurs.

December 2, 1916.—Large hard glands in pouch of pelvis.

Roentgen Examination.—November 27, 1916. Preliminary examination reveals a distinct increase of density and cloudiness in the bone structure, which seems quite characteristic of an osteoplastic process, which is indicative of a bone metastasis following a primary carcinoma of the prostate. In reference to the possible prostatic calculi, we are about to make further investigations concerning this point.

Roentgen Examination.—November 28, 1916. Further stereoroentgenographic examination does not reveal any shadows suggestive of prostatic calculi. The osteoclastic process, which I believe represents bone metastasis, involves the entire pelvis and most of the vertebrae. The ribs and femurs also show beginning changes.

IS THERE A MILITARY SURGERY?

By JAMES PETER WARBASSE, M. D., F. A. C. S., Brooklyn, New York.

So far as surgical treatment is concerned, it has not to do with the fundamental objects of war, but only with the outcome of the final object, which is to inflict hurt upon "the enemy." Both sides are "the enemy," and both require surgery. In modern warfare each side, so far as the soldiers, if not the diplomats, are concerned, has been brought to think that it is protecting its homes from the invasions of "the enemy," and naturally great zeal is thrown into the undertaking. The two deluded parties to the conflict, employing all of the mechanical devices which modern science has found to be capable of destroying life, proceed to assault each other. Up to the present time chapters on military surgery have dealt largely with gunshot wounds. Modern ingenuity, in its diabolic perversions of human talents, has now made gunshot wounds quite obsolete. War has become a matter of engineering, whereby powerful machines hurl vast pieces of metal, inclosing high explosives, which tear and mangle human beings into unrecognizable masses.

Lacerated wounds are most common, and asphyxiation from gases, drowning, and a small proportion of bullet wounds are the surgical causes of mortality. Stab wounds are rarely seen by the surgeon, because they are usually inflicted upon a helpless or prostrate man, who gives his last gasp far from the surgeon's care.

Military wounds that come to the surgeon are not peculiar. They are amenable to the same treatment as wounds sustained in other explosions and in accidents by land and sea. The surgeon who is most competent to heal the wounds of peaceful men is most competent to heal the wounds of men who, seeking to take other men's lives, have themselves become wounded. The same rules for checking hemorrhage, securing asepsis, draining, suturing, and dressing apply in one case as in the other. A bullet wound or a stab wound requires the same treatment, whether received in a barroom or on the field of battle. The common surgical ills which are suffered by soldiers, such as appendicitis, hernia, fractures, and infections, are best treated the same as in civil life.

The surgeon should be impartial, and devote the same skill to all, irrespective of whether the injury is sustained by a man who is performing useful service for humanity, or by one who has gone forth to kill his fellow-men. There is no more military surgery than there is a surgery of highwaymen, strike breakers, bull-fighters, or suicides.

The so-called "military surgeon" excels *the surgeon* in that he adds to his knowledge of surgery a knowledge of the technic of military camps, movements of troops, making of reports, "paper work," and a psychology of the glorification of militarism. All of these extra-surgical qualifications, however, need not exist in a surgeon, and to master them and devote time to them makes the soldier just so much less of a surgeon. It is not a function of surgery to know about camps, troops, and reports, nor the etiquette of the salute, nor the thousand and one petty relics of military traditions. These are the offices of soldiers, clerks, military experts, and cavaliers. Surgery is to heal the wounds of the suffering; not to ape the manners and methods of those who inflict them. As a matter of fact, when soldiers need surgery, they receive the best from surgeons, and it is apt to be the surgeon who is called from civil life who is found most useful.

Whether deluded men go forth to fight duels or to engage in the holocaust of war, they cannot be denied the privilege of a kindly hand to bind up their foolish wounds. It should be for soldiers and militarists to organize their machinery for having themselves placed in the care of surgeons when accidents befall them. Let them have their ambulances, carriers, dressing stations, field and base hospitals, if they wish. Let them have hospitals equipped with the best of appliances. Let them secure the best of surgical council and aid that they can obtain in their organization, and equipment. But let the soldier be one thing and the surgeon another. Let the surgeons who give their skill to the comfort of sick soldiers go to their task as surgeons—nothing more, nothing less. As many wounded as are brought, let them be healed as a holy service.

But let the surgeon not assume that he is called on to descend from his exalted place as surgeon to be either soldier, highwayman, strike-breaker, or bull-fighter, and put on the raiment and assume the manners of any of these because, forsooth, he is willing to bind up their wounds.

The zeal of militarism to create a cast among surgeons is not commendable. We should not permit ourselves to be victimized. A surgeon is a surgeon. A difference of clothes cannot designate a difference of surgery. The day has passed when there may be "men of the cloth" in the medical profession. It is unbecoming and inconsistent with the spirit of science and humanity. There may be militarists and military surgeons, but there is no military surgery.

COLLECTIVE ABSTRACTS

THE ETIOLOGY OF OBSTETRICAL PARALYSIS

By JAMES WARREN SEVER, M. D., Boston.

1. Lovett—The Surgical Aspect of the Paralysis of New-Born Children (Bost. Med. and Surg. Jour., July 7, 1892).
2. Carter—Obstetrical Paralysis, with Reference Especially to the Pathology and Etiology (Bost. Med. and Surg. Jour., May 4, 1893, CXXVIII, No. 18).
3. Walton—The Etiology of Obstetrical Paralysis (Bost. Med. and Surg. Jour., December 24, 1896, CXXVII).
4. Haynes—Obstetrical Paralysis in Infants (Brooklyn Med. Jour., May, 1897).
5. Robinson—Traumatic Birth Paralysis of the Upper Extremity (St. Thomas' Hospital Reports, 1899, XXVI).
6. Thomas—Two Cases of Bilateral Birth Paralysis of the Lower Arm Type, with Bibliography (Bost. Med. and Surg. Jour., October 19, 1905, CLIII, No. 16).
7. Warrington and Jones—Paralysis of the Brachial Plexus (Lancet, December 15, 1906).
8. Bullard—Obstetric Paralysis (Am. Jour. of Med. Sc., July, 1907).
9. Taylor—Results from the Surgical Treatment of Brachial Birth Palsy (Jour. Amer. Med. Assoc., January 12, 1907, XLVIII, No. 2).
10. Osterhaus—Obstetrical Paralysis (New York Med. Jour., November 7, 1908).
11. Bailey—Brachial Birth Palsy (Bull. Lying-in Hospital, New York, March, 1908).
12. Frazier and Skillern—Supraclavicular Subcutaneous Lesions of the Brachial Plexus Not Associated with Skeletal Injuries (Jour. Amer. Med. Assoc., December 16, 1911, LVII, No. 25).
13. Lange—(Muench. Med. Wochenschr., 1912, No. 26).
14. Frauenthal—Erb's Palsy (Am. Jour. Obs. and Dis. of Women and Children, 1912, LXV, No. 4).
15. Thomas—The Relation of Posterior Subluxations of the Shoulder-Joint to Obstetrical Palsy of the Upper Extremity (Ann. Surg., 1914).
16. Fairbank—Birth Palsy; Subluxation of the Shoulder-Joint in Infants and Young Children (Lancet, May 3, 1913).
17. Peltesso—Injuries of the Upper End of the Humerus in Birth Palsies (Berlin klin. Wochenschr., June 22, 1914, 1162).
18. Gaugele—So-Called Obstetrical Paralysis of the Arm (Zeitschr. fuer Ortho. Chir., XXXIV, hft. 3-4, 1914).
19. Van Neck—Congenital or Obstetrical Lesions of the Shoulder and Brachial Plexus (Jour. Méd. de Bruxelles, 1914, No. 11).
20. Gordon—An Unusual Form of Birth Palsy (Jour. Amer. Med. Assoc., December 26, 1914, LXIII, No. 26).
21. Platt—Birth Palsy (Brit. Med. Jour., May 8, 1915).
22. Darling—(Med. Jour. of Australia, October 9, 1915).
23. Stransky—(Centralbl. fuer die Grenzgeb. der Med. and Chir., 1902, with complete bibliography to date, 1902).
24. Rhode—(Zentralbl. fuer Kinderheilkunde, 1909, No. 4).
25. Sharpe—The Operative Treatment of Brachial Plexus Paralysis (Jour. Amer. Med. Assoc., March 18, 1916, LXVI, No. 12).

Obstetrical paralysis was first discovered by Smellie in 1768, who ascribed the condition to long pressure on the arm, but it was first brought to the notice of the medical profession in 1872 by Duchenne, who described 4 cases in infants, and attributed the condition to pressure of forceps or fingers in the axilla.

It was not until 1874 that Erb described the same type of paralysis in adults, since when it has been commonly known as the Erb-Duchenne paralysis. Erb showed that pressure above the shoulder caused this grouping and laid it to the "Prague" pull. As comparatively recently as 1886 Thorburn could find but five papers on the subject. The literature since then has been increasing rapidly.

Thorburn reported a lower arm case, and believed the tearing of the nerves to be due to hyperextension of the shoulder, as the arm was above the head, but also ascribed it to pressure of the clavicle on Erb's point from this bad position of the arm. Arens believed it due to hemorrhage or tearing of the nerves. Roulland gave all the various positions in which the condition could occur, and believed it due apparently to direct or indirect pressure. Dauchez believed the condition spontaneous from pressure on circumflex nerve in pelvis, and, second, traumatic from finger or instrumental pressure. He also believed, when the lower arm was involved, that the condition was one of pseudoparalysis, as also did D'Astros. Gowers believed it due to pressure from forceps, and Weil due to trauma, especially with an after-coming head. Peter thought it due to pressure of forceps, or strong lateral bending of the head, with a delayed shoulder, or turning of the head in breech cases. Guillemot likewise supported the theory that the condition was due to compression of forceps or a strong pull.

Up to within a year or so most of us have been reasonably content to accept the theory that the paralysis in these cases was due to a stretching or tearing of some of the roots of the brachial plexus, due to a forcible separation of the head and shoulders during labor. Other theories have been discussed and have been given some credence, but recently a new one has appeared. It seems that it is about time for us to take an account of stock, and see which of these various ideas which have been advanced are reasonable and based on pathological findings and clinical facts.

Duchenne recognized that the lesion might occur in obstetric operations, such as disengaging the upraised arm in a breech or footling presentation, in delivering after version, or in making traction on the arm of the child after the birth of the head, and quotes cases to support this theory. These procedures result in direct traction on the cords of the plexus, and, when force is used, probably cause injuries to the nerves.

Lovett reports nine cases, and discusses the conditions of the labor, most of which were long, hard, and instrumental. He believes that the paralysis is due to some direct injury to the brachial plexus, and is generally associated with strong traction made upon the head. Out of nine cases four had the right arm affected, four the left, and one case was not noted.

Carter believed strongly that overstretching of the cords of the brachial plexus is the cause of the paralysis. He reported 16 cases of his own, with an analysis of the conditions at labor, besides comparing his cases and observations with those reported by Lovett and Burr. He believed that in an O. L. A. position the right arm would be the one affected, and in an O. R. A. position the left arm would be the one to be injured. Nine of his own cases showed paralysis on the right and seven on the left. Burr's cases showed the right arm involved nine times in nine cases, regardless of position. Carter also discusses the factors of pressure forceps on the plexus, the hook and the finger pressing directly on the plexus in the neck, pressure of the finger in the axilla, and overextension of the arm. He does not believe that these factors are essential in the production of the paralysis.

Seeligmüller thought that pressure from forceps often caused hemorrhage about the plexus, and Jolly believed it due to pressure, chiefly with an after-coming head.

Walton states that "neither the seat of the lesion nor the method of its production has been absolutely determined, but that the preponderance of evidence appears to establish the brachial plexus rather than the spinal cord as the point of injury." He discusses the relations of the position of the fetus to the paralysis of the right or left arm, and reaches about the same conclusion as Carter, except that he believes that the injury to the plexus is brought about by pressure on the plexus by its being caught between the upper edge of the clavicle and the first rib. He believes that a more careful study should be made of the positions and presentations of these children, so as to determine the definite mechanics of the injury. He believes that the suprascapular nerve is independently stretched in the separation of the head from the shoulder, the distal point of fixation being either the suprascapular notch or the outer edges of the scapula spine, around which the nerve immediately passes, or both.

Haynes reports 3 cases and quotes Erb, who says it is due especially to the energetic application of the so-called "Prague grip," in which the fingers are applied like a fork over the back of the child's neck, with an after-coming head, and endangering the brachial plexus by energetic traction and compression. He also quotes Starr, who says, "It is the pressure of the obstetrician's fingers which causes the injury in the majority of cases, and I have noticed that in 75 percent of the cases seen the paralysis was in the left arm, which finds its explanation in the greater length of the middle finger of the hand which is doing the damage. In the act of traction there is a tendency of the obstetrician to flex the fingers, and then the tip of the finger is pressed deeply into the side of the child's neck." This is very interesting, but hardly scientific. Haynes presents no new ideas on the subject.

Robinson reports 17 cases, in only one of which was the birth reported as normal. All the others had a definite history of the labor being tedious and difficult. In 11 the presentation was cranial; in three special mention was made of difficulty in delivering the arms; four others had forceps applied. He states that J. E. Simpson has shown that the heads of boys are larger than the heads of girls, and therefore the heads of the latter would not dilate the way for the shoulders as well as the former. In his own series, 13 cases out of 17 were girls, which would bear out this theory that there was an insufficiently dilated canal for the shoulders, and that they therefore caught or were with difficulty delivered, and in so doing there was a strain put upon the cords of the plexus.

J. J. Thomas, Warrington, and Jones believed the paralysis to be due to overstretching of the nerves of the plexus at birth; and Thomas reports two cases of bilateral paralyses of the lower arm type, following difficult labors with face presentation, where he believed the injury to be the result of excessive lordosis or hyperextension in the face position, a view also concurred in by Jolly.

Bullard likewise believes that overstretching of the nerve trunks is the cause of the paralysis, and that traction on the head in the axis of the body is less injurious than when the traction is made obliquely, so that the head is inclined to one side when the traction is made. Rotation of the head to the opposite side also stretches the nerves. Firm resistance should be offered in order to have the force effective on the nerves, which may be supplied by a shoulder caught behind the pubes, or by an after-coming head in a breech delivery. Asphyxia is also a favorable condition, in that with the child in that condition all muscles are fully relaxed and their resistance is absent. Under this condition the nerves, without their usual support and protection, are more easily torn. He found that the cases generally occurred when the labor was long and difficult, when instruments were used in abnormal presentations, especially breech, and when the child was asphyxiated. In regard to the position

of the occiput, it has been stated that in an O. L. A. position the right arm would be the one paralyzed, as the right shoulder would be the one caught behind the pubes, but this was not borne out by the few observations he was able to make, for in 17 cases of O. L. A. position 8 were paralyzed on the right and 9 on the left.

Taylor states that the cause of brachial birth palsy is due to tension or overstretching of the nerves of the brachial plexus. This he has confirmed by numerous dissections and experiments on infantile cadavers. The overstretching was caused by forcible separation of the head and shoulders in vertex presentation by pulling on the head, and in breech presentation by pulling on the shoulder, by the so-called "Prague" method. He reports the delivery of a breech case when he felt the roots of the plexus tear under his fingers, which was later confirmed by autopsy.

Osterhaus likewise believes the injury to be due to overstretching.

Bailey believes the condition concerns the obstetrician more than it does any other practitioner. He states that, while pressure is the generally accepted cause, he is of the opinion that overstretching and traction of the plexus is the real one. He states that if the axis of the head is drawn away from the long axis of the body by 30°, the cords of the plexus are drawn to the danger point. This is liable to happen in vertex presentations to hasten the delivery of the shoulder, and in breech presentation to hasten the delivery of the after-coming head. It may also happen in extraction by forceps, and in spontaneous birth the delivered head, by its own weight, may cause traction on the plexus.

Frazier and Skillern speak of the older theory that the brachial plexus injuries were caused by the plexus being crushed or squeezed between the clavicle and first rib, or transverse processes of the cervical vertebrae. Subsequent observations, however, have proved that in all cases the essential element in the causation is traction on the nerves.

Lange believes the paralysis due to a tearing of the capsule of the shoulder-joint, which at first limits motion because of pain and then from habit. He was the first to suggest the theory which T. T. Thomas has taken up, that the condition is purely secondary to a shoulder-joint injury. It should rightly be called "Lange's" theory.

Frauenthal believes also in the overstretching theory and reports cases, but is rather optimistic as to his results.

T. T. Thomas, in an interesting theoretical discussion of the problem, based on a study of 9 cases, averaging six and a half years, concludes that the paralysis is secondary to a primary traumatic dislocation of the shoulder occurring at birth, associated with a tear in the joint capsule and a consequent involvement of the plexus in the exudate, practically Lange's theory (see above). He does not explain why the exudate always avoids the major portion of the plexus in the region of the shoulder-joint, or why it practically always works its way at least two inches above the clavicle and picks out the junction of the fifth and sixth cervical nerves, to produce the characteristic paralysis. This theory of his, which really should be attributed to Lange, is ingenious, but not reasonable, nor based on clinical or pathological evidence. Erb's point is small, and it requires definite injury at this point to produce the characteristic paralysis, as well as injury above this joint on the fifth cervical root, to produce the paralysis of the supra and infra spinati from trauma to the suprascapular nerve, which comes off the 5th c. well above Erb's point.

Fairbank is another believer in the traction theory, and he reports 40 cases, 32 of which were vertex presentations and 7 breech, which rather refutes Tubby and Sherren, whom he quotes, who believe that it occurs equally in the two presentations. He also states that long difficult labors, where forceps were used, predispose to the injury.

Peltesohn has found a number of cases which he reports as "false birth palsies." He described typical end results of cases of obstetrical paralysis. He states that the condition is due to injury of the upper epiphysis of the humerus at birth. In true Erb's paralysis there is no disturbance of the epiphysis.

Gaugele states that so-called obstetrical paralysis is not a true paralysis, and the cause of the condition is an injury to the capsule and soft parts, with subsequent contraction. Injury to the epiphysis or other injury is not uncommon. He evidently bases his conclusion on the study of four cases, and is not familiar with the work of other observers.

Van Neck believes that other conditions than injury to the plexus may simulate obstetrical paralysis, such as epiphyseal injuries of the head of the humerus, congenital developmental errors of the plexus, and shoulder torsions, resulting in a tear of the capsule. These all present definite clinical pictures, and by x-ray and careful clinical examinations the diagnosis should be made easy and not confused with obstetrical paralysis.

Gordon believes also in the traction theory, as well as the theories, now discarded, of direct pressure on the plexus by the obstetrician's finger, the hook, and pressure by the clavicle and transverse processes.

Platt is also a follower of the traction theory, and bases his ideas on five cases. He quotes other authors, including Lange and Vulpian, the former believing in the laceration of the capsule theory and the latter in the theory of epiphyseal displacement as causes of the paralysis and subsequent deformity.

Darling, in an extensive study of the various lesions of the brachial plexus and a discussion of the various theories, accepts the ones based on definite nerve findings and pathology, and believes that traction on the cords of the brachial plexus is the generally accepted one in view of clinical and experimental evidence.

Stransky, in a most careful review of the whole literature up to 1902, presents the subject in detail and most conclusively. He reviews Smellie (1700), Danyau (1851), Guéniot (1867), and De Paul's work, the latter cited by Seeligmüller. He reports 94 cases from various authors whose work he has reviewed.

Küstner advances a theory that has been rejected at once by all other writers who have had any extensive experience with the cases—namely, that the trouble is usually due to a fracture of bones or separation of the humeral epiphysis. Stransky believed that pressure as well as hard pulling in some cases was an adequate cause, especially if ether had been used and the child was asphyxiated. He quotes the following experimental work. Fieus opposed Erb's views in that Erb's point was too small and that the pressure would have to be too sharply localized, so that on the whole the theory that finger pressure or forceps could produce it was unlikely. Pressure of finger he also rejects, for there was nothing for the finger to compress the plexus against. He comes finally to traction on the upper roots as the longest side of the triangle, with lateral inclination of the head, as tending to increase the distance between the head and shoulder. He produces the paralysis in rabbits by pulling the head forcibly to one side. Schoemaker also conducted experiments on cadavers, with the plexus exposed, and could always tear the c. 5 and c. 6, but never the c. 7 and c. 8. He also thought that the clavicle could cause pressure on the plexus by having it caught between the clavicle and first rib and spine. He was opposed to the theory that pressure from the fingers caused the injury. Küstner and Landold also did experimental work and believed the injury due to traction. Stolper agreed in the main with Fieus and Schoemaker, but rejected the possibility of pressure on the plexus in

breech cases, and believed that clavicular pressure might cause the paralysis. He believed, however, that stretching was the main factor.

Sharpe has demonstrated that direct injury of the nerves always occurs, as shown by operation on the plexus in 50 cases, in every case finding definite pathological evidence of injury. He believes the injury caused by overstretching of the plexus at birth due generally to an obstructed shoulder.

This rather hasty review of the most important literature on this subject shows that the majority of observers incline toward the traction theory, which is in turn definitely supported by pathological and clinical evidence. It is not questioned that fracture and epiphyseal displacement occur, and that they may be associated with an injury to the brachial plexus as a separate entity, but that they are the one cause of the usual type of birth palsy cannot be accepted. I have seen a number of cases of fracture of the upper end of the humerus occurring at birth which simulated brachial palsy, but on careful study were properly diagnosed. The after-course was quite different from that seen in brachial plexus injuries.

MODERN PERIMETRY—A REVIEW OF RECENT LITERATURE.

By CLIFFORD B. WALKER, M. D.,

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5. Duane, A.—The Tangent Curtain (Arch. of Ophth., 1906, XLII, 420-591).
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12. Rönne, H.—Defects of Nasal Field in Glaucoma (Arch. fuer Ophthal., LXXI, 52).
13. Rönne—Gesichtsfeldsstudien über das Verhältniss zwischen der peripheren Sehschärfe und dem Farbensinn, speziell die Bedeutung derselben für die Prognose der Sehnervenatrophie (Klin. Monatsbl. fuer Augenh., 1911, N. F., XI, 154).
14. Rönne—Ueber den Fasernverlauf im Chiasma, beleuchtet durch einige Gesichtsfelduntersuchungen (Klin. Monatsbl. fuer Augenh., 1910, N. F., X, 455).
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19. Sinclair, A. H. H.—Glaucoma; Restriction of Both Fields (Tr. Ophth. Soc. of U. K., XXVI, 261).
20. Traquair, H. M.—Quantitative Method in Perimetry; Perimetric Apparatus (Ophth. Rec., 1911, XXX, 65).
21. Van Der Hoeve, J.—Enlargement of Blind Spot, an Early Symptom of Optic Nerve Affection Due to Posterior Nasal Accessory Sinus (Arch. of Ophth., XI, 30; Arch. fuer Augenh., 1911, LXX, 155).
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23. Walker, C. B.—New Instruments for Perimetry (Arch. Ophth., 1913, XLII, 577).
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Briefly stated, modern or quantitative perimetry involves the use of a series of test objects varying in the visual angle they subtend from one minute to eight degrees. One minute is close to the lower limit of visual acuity, and objects of this size normally give fields 10° or less in extent, depending considerably on the light. On the other hand, increase of disc size beyond eight degrees seldom adds much information. This range of visual angles may be satisfactorily represented by a series of eight or ten discs.

While it may not be necessary in all cases to use more than half the above number, nevertheless the time and labor necessary to get a complete field examination will be increased two or three times over what it was to take a field by the old method, using only one size of disc. Even by the old method, field taking was generally conceded to be an unprofitable drudgery, usually relegated to assistants, interns, or even nurses, who for the most part had very little interest in the onerous task other than to get it done well enough to pass muster with the chief; and the chiefs, drifting more or less away from the subject, were satisfied to get along with knowledge of gross defects only, often admitting that they never took a field and knew little about it. Indeed, if occasion demanded that they take a field due to lack of assistance, the time equation often forced them to produce a record no better, perhaps worse, than that of an assistant.

With a few exceptions, these statements are quite true, I think; otherwise the quantitative method of perimetry would not have been so generally neglected up to the last few years. Colonel Elliott published his glaucoma operation in 1911, and in three years it was in general use, while Bjerrum published the fundamentals of the quantitative method of perimetry in glaucoma cases in 1889, over a quarter of a century ago, and it is not yet in very general use. Indeed probably there are a great many ophthalmologists today who are well equipped to do the Elliott trephine operation for glaucoma, but are not equipped to make early perimetric or screen diagnosis of glaucoma requiring examination with the smallest visual angles.

Bjerrum, finding it difficult to make discs less than 1 mm. in size for use on his perimeter of 300 mm. radius, simply increased the distance to 1 or 2 meters and used a black curtain instead of the perimeter; 3- and 6mm. discs or white-headed pins were usually used. The fraction disc diameter (distance), usually expressed in mm., represents the visual angle of any disc used when multiplied by $\frac{180}{\pi}$.

This fraction was used by Bjerrum to record the test objects used, and is probably the best method both for screen and perimetric records, although in this country the perimetric distance will usually be some odd number between 260 and 290 mm. rather than an even 300 mm., as used by Bjerrum. Thus a 2-mm. disc on the screen at 2 meters may be labeled $\frac{2}{2000}$,

while a 5-mm. disc on a perimeter of 280 mm. radius may be labeled $\frac{5}{280}$. This notation is, of course, suggestive of the usual method of recording visual acuity.

The lines representing the field for the various visual angles may be called isopters, and give the best idea of the field when recorded on a single large chart, though a separate chart of increased scale is often used for the screen records. Many comparisons have been made to emphasize the incompleteness of the old type of field. It seems to me that the surface contour map is most analogous. Thus we may say that a field examination with only one size of disc is just as incomplete as a contour map with only one elevation line recorded.

Bjerrum's work was largely confined to glaucoma, in which condition he demonstrated a tendency for a defect to form in the upper nasal quadrant,

tending to connect with a scotoma, often arcuate between the blind spot, enlarged, and the macula. This phenomenon has become known as Bjerrum's symptom of glaucoma, and was worked out on the screen with objects of small visual angle, as described. Although the method was studied and used by Duane, who in 1906 described his tangent curtain, on which a variety of other examination could also be performed, it was not until twenty years after Bjerrum's publication that Rönne, by much admirable work and many publications, finally won more general attention from the profession. In Bjerrum's clinic he studied large numbers of glaucoma and other cases, and demonstrated a variety of scotomata in the region of the blind spot and macula, which, for the most part, suggested by their shape the path of optic nerve fibres extending from the optic disc. This finding seemed to support the theory that the optic disc margin was the point where the damage was done. Rönne encouraged the extension of the Bjerrum method to all cases where early defects, especially scotomatous, might be expected.

Sym and Sinclair exploited the method in England, and devised apparatus, as did also Traquair, who further emphasized the similarity of the field defects in the early stages of glaucoma, sinus disease, and pituitary struma, as regards the damage in the region between the macula and blind spot; the latter two conditions also having similar peripheral defects, usually upper temporal in location.

I have used the quantitative method extensively in cerebral cases. Where the field defects are well marked with 5-mm. disc, I have emphasized the value of a series of larger discs to get an indication of the amount of atrophy in the defective area and consequent prognosis after operative relief. The screen has been found very useful in detecting the very earliest field defects, using it mostly at a distance of 3 meters, since I have shown that test objects down to 3 minutes visual angle can be satisfactorily made and used on a special perimeter. Below this the size of the handles becomes so large with respect to the spot that the screen test at 2 or 3 meters is preferable, though the examination can be entirely performed on the perimeter.

This brief sketch of modern or quantitative perimetry and its development is today a matter of fairly common knowledge among ophthalmologists, yet the number who actually use it is not great. This attitude toward quantitative perimetry is well shown in Peter's recently published book on the subject. While he admits that Bjerrum's method is excellent and describes it sketchily, he leads one to believe that he has never used the method himself, and gives no example of his own, though one unlabeled field from Rönne is given. Indeed, in passing it may be noted that the labeling or data for the charts presented throughout the book is regrettably lacking. Rarely is the size of disc used or the visual acuity indicated. A field record cannot be considered complete without such data. While the author has not given sufficient details of the methods and examples of the records of quantitative perimetry, he has exploited at great length the old blackboard or campimeter method of Von Grafe. Although the campimeter is a handy accessory in certain well-marked scotoma cases, one has but to enlarge the central portion of a perimeter 30 or 40 degrees and the campimeter may be dispensed with; but a Bjerrum screen for use at 1 to 3 meters must be available for complete examinations.

The book is, however, well written, the material is well presented, and a commendable bibliography is appended. The author is to be congratulated for having produced a handy and presentable little volume, which will doubtless be used by many who otherwise, possibly, would not take the time to look up the subject in special chapters of larger works. The hope of the author that a deeper and more general interest in perimetry can be stimulated by such a book should be fulfilled.

RESULTS IN THE TREATMENT OF PULMONARY TUBERCULOSIS BY ARTIFICIAL PNEUMOTHORAX.

By JEROME E. COOK, M. D., St. Louis.

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7. Sachs—(Ibid.)
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10. Lucas—(British Med. Jour., 1915).
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18. Mace—(Jour. Amer. Med. Assoc., 1915, LXIV).
19. Kessel—(Arch. Int. Med., 1914).
20. Fishberg—(Medical Record, 1915).
21. Balboni—(Boston Med. and Surg. Jour., 1914).
22. Webb—(Arch. Int. Med., 1914).
23. Lyon—(Boston Med. and Surg. Jour., CLXXI).
24. Orlowski and Fofanow—(Beitr. z. Klin. d. Tuberk., 1914).
25. Von Muralt—(Beitr. z. Klin. d. Tuberk., XXX).
26. Mayer—(Beitr. z. Klin. d. Tuberk., XXIX).
27. Breccia—(Ibid.)
28. Tobaisen—(Ibid.)
29. Zink—(Beitr. z. Klin. d. Tuberk., XXVIII).
30. Zinn and Geppert—(Beitr. z. Klin. d. Tuberk., XXXIII).
31. Shortle—(Jour. Amer. Med. Assoc., 1916, LXVII).

Quite a number of years have elapsed since the introduction of the method of treating pulmonary tuberculosis by injecting gas into the pleural cavity, yet there still exists a wide diversity of opinion as to its value. As a method of treatment, its advantages must be weighed in the same manner in which we have learned to evaluate our other methods. The patient's social condition, the stage of the disease at which treatment was instituted, the length of time during which the patient was under treatment, the immediate effect of the treatment, and its more or less remote results—all must be taken into account. Since, in the estimation of these several factors, the different reporters conform to no uniform standard, there can be little surprise that their conclusions often represent quite divergent opinions; yet it should be possible to arrange the data in such a manner as to allow of critical analysis. In so doing, no attempt will be made to set forth all phases of the subject, but only such as are of cardinal importance. First among these, it would seem, must be placed the question of indications.

Several years ago the opinion prevailed that artificial pneumothorax was suitable only in old, advanced cases of tuberculosis. This idea has undergone distinct revision in the more recent articles. It is now quite generally advocated that the treatment should be instituted much earlier, and that it must be considered in any case which, under good care, shows a continuously pro-

gressive tendency. The extent of the involvement thus becomes a matter of secondary consideration, except in so far as the "good" lung must show no trouble or only very little.

Several considerations have worked to bring about this altered view. When the procedure was reserved for far advanced cases, the good results were so few as to make it evident that the method thus employed could play little part in altering the general mortality of the disease. Only a small percentage of advanced cases, variously estimated at from 5 to 10 percent, were suitable for treatment—that is, had their disease mainly or exclusively on one side of the chest and were free from serious tuberculous disease in other parts of the body. Of these cases selected as "suitable," adhesions prevented satisfactory lung collapse in a very considerable number—between 30 and 50 percent. Thus an overwhelming percentage of cases were barred from the treatment. It was clear that, if the method was of real worth, its use must not be delayed until such a time as would leave only the exceptional case the chance for benefit. It is true that there are a number of isolated reports in which the method, employed as an ultimum refugium, has given startling and unexpected results, but these are too few to warrant consideration. Another fact which has been potent in advancing the cause of earlier pneumothorax therapy has to do with the ultimate fate of the collapsed lung. It was at first believed that a lung which had been compressed underwent fibrous changes and must remain forever functionless. To place permanently out of commission a lung which contained much healthy tissue was deemed unjustifiable. But it has been shown by Lapham, Zinn and Reppert, Zink, and others that no such permanent collapse occurs. When the injections of air are stopped, the lung will slowly expand, even when the compression has been maintained over many months. There can, therefore, be no objection to instituting the procedure in cases in which the lung possesses a considerable amount of sound tissue.

Concerning one indication for the treatment, there is quite general agreement. In cases with severe, recurring hemorrhages the results, as far as the stopping of hemorrhage is concerned, are brilliant and often life-saving. The unanimity of expression on this point leaves little doubt that we have here a strict indication which, when heeded, promises most gratifying immediate benefit. It is, perhaps, needless to say that, when the lung involvement is bilateral, great care must be taken to determine the side from which the bleeding occurs before instituting the artificial pneumothorax.

A patient who is receiving pneumothorax therapy should be kept under closest medical observation. While some of the reports, such as those of Balboni, are from ambulatory clinic cases, it is certain that hospital care, at least in the beginning, is essential to the proper administration of the treatment. This is true for several reasons. In the first place, if the indications are observed, the cases will be limited to those who are more or less distinctly ill and who need, aside from any other consideration, more or less complete rest. Moreover, in following the course of the treatment the x-ray is of the greatest value and should be easily accessible. The only satisfactory method of ascertaining the degree of compression obtained, thereby guarding against overfilling and underfilling alike, is by its aid. Considerable harm can result from introducing too much air, while an incomplete collapse is usually without beneficial results. Too much, however, must not be expected from the x-ray. Those who would use it to determine the presence or absence of pleural adhesions will find disappointment awaiting them. Unfortunately there is no way in which the physician can be sure that lung collapse will not be prevented by adhesions, or that a chosen site is favorable for puncture, other than by actual trial with his needle. Outside of this rather frequent inability to locate a free pleural space, the method is quite free from technical difficulties. Certain pre-

cautions must be observed, such as careful attention to the manometer readings and oscillations, strict asepsis, watching for signs of shock in the patient, etc., but in general the procedure is surprisingly simple. Air embolism and "pleural shock" have both been mentioned as immediate complications. They are, however, most infrequent, and a discussion of them will be omitted here.

Another complication of distinctly more importance, but more insidious in its onset, is pleural effusion. There is considerable divergence of opinion both as to the frequency of this complication and as to its effect on the patient's chance for recovery. This is apparently due to the fact that effusion, while it sometimes occurs early, may occur at any time during the course of a pneumothorax therapy, and, not infrequently, first makes itself manifest at least several months after the beginning of the procedure or even after the patient has passed from observation. For this reason the figures on this point show wide divergence, but one gains the impression that the longer the patients have been kept under observation the higher the percentage will go. Thus Peters claims that over 60 percent of patients whom he has observed for a year or longer have shown fluid, and von Muralt, who has also kept his patients under observation for protracted periods, has seen effusion in 50 percent. Other workers place the figures lower, but even the best reports—those extending over only a short period of observation—do not place the incidence of effusion lower than 20 percent. It can readily be seen that if, as Fishberg puts it, this is a "serious complication," grave doubt is thrown on the value of the entire method. If from the very nature of a procedure a "serious complication" is ultimately induced in more than 60 percent of those treated, the procedure is almost self-condemned. While it seems, from the various reports, that effusion may not exercise a distinctly unfavorable influence, one cannot but feel considerable misgivings about the matter. Balboni says that effusions are unfavorable, especially if occurring early; von Muralt says they seem favorable unless purulent or excessive, or giving rise to fever—rather serious exceptions; Bullock and Twichell state that the complication is not unfavorable per se, but only 1 case out of the 26 which they report as doing favorably had any considerable effusion; Peters says they are not favorable, but not necessarily unfavorable; Schwatt calls them unfavorable. These views are certainly not encouraging and cannot help but influence seriously our opinion of the entire pneumothorax therapy. Moreover, since the complication may develop many months after the first injection of air, the patient may first do well, be reported as such, and later suffer serious setback from pleural effusion. This factor must play a considerable rôle in explaining the differences in the so-called final results as reported by the various observers.

Unfortunately, there are no adequate figures on which one can base an opinion as to the final outcome of these artificial pneumothorax cases. Most authors fail to give any figures at all. Some reports are of far-advanced cases exclusively, while others are a mixture of advanced and early progressive cases. The periods of observation are not uniform, and the entire number of cases is too small to allow of anything more than an approximation of results. In the advanced cases the reports are very discouraging, though not always as poor as Kessel's, who reports no recovery in 29 cases. But even the good results—those from series in which there were a number of early progressive cases—are, with one exception, not better than 18 percent. For the most part these good results have been observed from one to two and a half years, and are variously recorded as "apparently well," "apparently arrested," "in perfect health," etc. Some of them have returned to their usual occupation.

The question naturally arises, "What percent of these same cases, taken at the same time, would have shown equally satisfactory results if they had been treated according to the more usual methods?" It is, of course, impossible to

give any direct answer, but every physician has seen progressive and advanced cases of tuberculosis do well. In this connection it is interesting to cite two cases reported by Webb. They were advanced cases and had been given up as hopeless, but artificial pneumothorax was proposed as offering a possible chance. The treatment was refused. Both patients began to improve, and, at the time of the report, were walking several miles a day and were practically free from cough and expectoration. But the opposite picture is furnished in a recent paper by Shortle, who, from the standpoint of final outcome, records the most favorable results that have come to our notice. The seventy-nine cases in which the pneumothorax therapy could be successfully instituted were of the advanced, progressive type. Twenty-one of these have been discharged as symptom free from three years to six months. Of these twenty-one patients, two are now dead and 15 are well and working. Comparing those who received the treatment with those in whom it was attempted, but failed on account of adhesions, it is seen that "of the inoperable patients only 2, or 8 percent, are working, and only 1, or 4 percent, is improved; while of the patients operated on, 22, or about 28 percent, are working, and 25 percent are in good shape physically." The patients were all under sanatorium conditions, and were more or less favorably situated financially.

It seems that the following conclusions are justified from the foregoing reviews:

1. The complications following artificial pneumothorax are so serious as to contraindicate the procedure in incipient or early favorable cases.
2. In moderately advanced cases or early progressive cases with unfavorable clinical symptoms, such as repeated hemoptyses, high fever, or excessive cough, the method may be tried. In a fair percentage of these cases improvement will take place and the patient will apparently be saved. However, protracted observation will materially reduce the number of those cases to whom the method seemed to offer a cure of their tuberculosis.
3. Artificial pneumothorax is not in any sense a cure for consumption. In carefully selected cases it may be productive of some good.

DIAGNOSTIC AND THERAPEUTIC NOTES.

THE EXTENDED OPERATION FOR CARCINOMA OF THE UTERUS. Peterson (Surg., Gyn. and Obstet., September, 1916). Further experience with the radical abdominal operation for cancer of the uterus confirms the author in his belief that it is an exceedingly dangerous procedure and will always be attended by a high primary mortality. Nevertheless, it is the only procedure, with the possible exception of the extended vaginal operation, which holds out any reasonable promise of a permanent cure. The surgeon must thus face the dilemma that, unless the operations be radical, the end-results will be poor, and, if they be radical, the primary mortality must be high. Since 1912 the author has done 14 ordinary panhysterectomies for cancer of the fundus. Since these unfortunately show at once worse primary results and worse end-results than his 11 cases previously reported in which radical removal was performed, he has determined hereafter to subject all such patients to the extended operation.

The end-results in 51 patients operated upon five or more years ago were most gratifying, combining fundus and cervix cases. Over 56 percent of all cases of uterine cancer operated upon were alive after five years, this being nearly 70 percent of those surviving the operation. In spite of the high primary mortality, these end-results encourage us to continue with the procedure in suitable cases.

CIRCULATORY FAILURE IN ACUTE INFECTIONS. Goodridge (Am. Jour. Med. Sc., January, 1917). Recent experimental work has made the explanation of circulatory failure in acute infections even more uncertain than it was before. It is certainly not entirely due to myocardial impairment, and even less to failure of the vasomotor center. There probably comes into play some third element, the nature of which remains obscure.

The therapeutics of this condition has, however, been pretty well worked out. That alcohol and strychnin are absolutely worthless drugs in the treatment of circulatory failure in acute infections seems certain. Epinephrin and pituitary extract, on the other hand, are useful in the treatment of sudden circulatory collapse, but the duration of their action is brief. In pulmonary edema the nitrites are often valuable because of their selective action in constricting the pulmonary arteries. Caffein is useful, probably by increasing the flow of blood to the heart. Finally, recent experimental work has shown that digitalis acts upon the heart in febrile conditions just as it does in nonfebrile states, and must be our main reliance in the heart failure, especially of pneumonia.

A NEW TREATMENT OF BRONCHIAL ASTHMA. Kuhn and Emsheimer (Arch. Int. Med., October, 1916). The writers were led to their method of treatment by the consideration that, since bronchial asthma is due to sensitization by a foreign protein, the hypodermic injection of the latter, repeatedly and in small doses, should lead to immunization and so to a cure of the disease. Ordinarily the protein responsible for the attacks cannot be definitely determined. The authors assume, however, that it is present in the patient's blood especially just before or early in an attack. Accordingly they recommend that moderate

amounts of blood be withdrawn from such patients, defibrinated and then injected subcutaneously. They state that six cases so treated all showed definite improvement as indicated by a diminution in the frequency and severity of the attacks and by a considerable gain in weight and strength.

However skeptical one may be regarding the theoretical grounds advanced in favor of the treatment, the empiric results seem to justify further trial. Personal communications, to the writer of this abstract, from several men who have used the treatment indicate that it is not without value.

EXOPHTHALMIC GOITER. Mackenzie (Lancet, November 11, 1916). Hector Mackenzie's personal experience with operation in cases of exophthalmic goiter has, on the whole, been very unfavorable. While he has seen patients who have been benefited, he has not seen any case that he could say was actually cured. If done at all, he thinks, the operation should be performed under local anesthesia. This is especially true of younger subjects. Ligation of the thyroid arteries does not appear to have any appreciable effect on the disease, and therefore, if done at all, it should be only as a forerunner of thyroidectomy. The latter would, however, also prove unavailing unless a sufficient amount of gland is removed. If possible, more than an entire lobe should be removed at one operation. The operative risk is not appreciably increased if this is done, whereas, if a whole lobe is left behind, another operation will probably be necessary at a later time.

THE DIAGNOSIS AND CLINICAL CHARACTERISTICS OF GOUT. Pratt (Boston Med. and Surg. Jour., December 28, 1916). The prompt relief from pain produced by colchicum in gout is so striking that many have asserted that this drug is a specific in gout. It is certainly an aid in diagnosis, as colchicum does not have such a marked effect in relieving the pain in acute rheumatism or in other conditions which may be confounded with gout. Salicylates rarely have any marked effect in controlling the pain of acute gout. The relief from severe pain of gout afforded by atophan is even more striking than that produced by colchicum. Its value in diagnosis is probably less, as it often is of considerable aid in checking the pains of nongouty arthritis.

CALAMINE LINIMENT. Pusey (Jour. Cutan. Dis., December, 1916). In order to overcome the drying effect of a simple calamine lotion, the author has devised a liniment whose formula is practically that of the common calamine lotion, with the addition of olive oil and enough tragacanth to make a permanent emulsion. Its formula is as follows:

Powdered tragacanth.....	3 1
Phenol and glycerin, mixed.....	aa m 10
Zinc oxide and calamine, mixed.....	aa 5 1
Olive oil.....	3 4
Water.....	q. s. O 1
Oil of bergamot.....	gtt. 20-50

The few drops of phenol keep the liniment sweet indefinitely. It must be prepared with some care, following the detailed instructions of the author, for which the reader must be referred to the original article. In general, the method is the common one used by careful pharmacists for making emulsions.

The product is a smooth, pink emulsion, which, if well made, remains emulsified indefinitely. It has been found not only a good substitute for the

old calamine lotion, but a liniment that may be substituted for ointments with convenience and good effect. When smeared on the skin, it leaves a coat of powder like that from a calamine lotion, but one which is slightly oily. Most of the common dermatological remedies may be incorporated with it. A mixture which patients find very grateful for extensive itching dermatoses is—

Camphor-phenol	m 20-30
Camphor-chloral	3 ½-1
Calamine liniment.....	O 1

SUBLINGUAL MEDICATION. Paulson (Practitioner, October, 1916). For the absorption of concentrated remedies directly into the circulation, the author regards the sublingual space as the most reliable surface in the whole body. The only preparation necessary is rinsing with water if the mouth is dry. A morphin and atropin tablet, powdered with the point of a penknife, on paper creased in the center, and dropped just behind the teeth, the tongue being restored to its normal position, will be absorbed in a few seconds. An apomorphin tablet, administered in this way, will induce vomiting at once. Compared with hypodermic injection, the author considers the sublingual method quicker, easier, safer, cleaner, and far more reliable.

BOOK REVIEWS.

THE PRACTITIONER'S ENCYCLOPEDIA OF MEDICAL TREATMENT. Part I: Methods of Treatment. Part II: Agents in Treatment. Edited by W. Langdon Brown, M. D., F. R. C. P., Assistant Physician to St. Bartholomew's Hospital and Physician to the Metropolitan Hospital, and J. Keogh Murphy, M. D., F. R. C. S., Surgeon to the Miller General Hospital for South-East London and to the Paddington Green Children's Hospital. With an introduction by Sir Thomas Clifford Allbutt, K. C. B., M. D., F. R. S. New York: Oxford University Press. 1915. Price, \$8.00.

In the "Practitioner's Encyclopedia" the entire field of medical therapeutics is covered in one stately volume of nearly 900 pages. Each disease and nearly each method of treatment is discussed in a separate chapter. There are over a hundred contributors, each of whom supplies one or more chapters, and, as all are Englishmen, the whole supplies an interesting picture of British medical practice. The general level of the contributors is high, and we have found the volume a thoroughly useful book of reference.

A TEXTBOOK OF HUMAN PHYSIOLOGY, Including a Section on Physiologic Apparatus. By Albert P. Brubaker, A. M., M. D., Professor of Physiology and Medical Jurisprudence in the Jefferson Medical College; Formerly Professor of Physiology in the Pennsylvania College of Dental Surgery; Formerly Lecturer on Physiology and Hygiene in the Drexel Institute of Art, Science, and Industry. Fifth edition, revised and enlarged. With 1 colored plate and 259 illustrations. Philadelphia: P. Blakiston's Son & Co. 1916. Price, \$3.00.

The fifth edition of Brubaker's "Physiology" has the same merits as its predecessor, and does not differ greatly from it. The most important addition is a discussion of the autonomic nerve system and of the phenomena of electrocardiography. The tendency of this book is to replace matters of theoretic importance with those of a more practical interest, an attitude for and against which much may be said.

THE DIAGNOSIS AND TREATMENT OF HEART DISEASE. Practical Points for Students and Practitioners. By E. M. Brockbank, M. D. (Vict.), F. R. C. P., Hon. Physician, Royal Infirmary, Manchester, Clinical Lecturer on Diseases of the Heart, etc. Second edition. With illustrations. New York: Paul B. Hoeber. 1916. Price, \$1.25.

The value of so brief a discussion of the vast field of heart disease seems questionable, even though the writer limits himself to what he calls "practical points." The book may appeal to the practitioner confused by the flood of the recent polygraphic and electrocardiographic literature or to the student cramming for an examination, but both would do better to turn to Mackenzie's recent summary of the subject.

ROENTGENOGRAPHIC DIAGNOSIS OF DENTAL INFECTION IN SYSTEMIC DISEASES. By Sinclair Tousey, A. M., M. D., Consulting Surgeon St. Bartholomew's Clinic, New York. With 75 pages and 64 roentgen illustrations. New York: Paul B. Hoeber. 1916. Price, \$1.50.

This should be an unpleasant book for the dentist because it constantly accuses the dentist of shortcomings in the management of bad teeth. Tousey finds trouble in more than 60 percent of teeth which have poor root fillings. As he so clearly reasons and illustrates, the roentgen ray provides an excellent survey of the tissues about the apices of the teeth. The focal infections thus shown are a great problem to physicians and dentists alike. This monograph will help in the solution of the problem and will serve to educate the dentist, console the physician, and excite the patient.

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EDITORIAL.

THE MEDICAL PROFESSION AND WAR.

As we go to press the inhabitants of this country are distraught by a critical international situation. Those who are of foreign birth have ties of blood which tend to draw them, only too often, in a direction opposed to their duties of allegiance or their honor as guests in a hospitable country. We physicians are in a singularly fortunate position in that embarrassments of this nature do not affect us in our professional capacities, even if we be called on to serve in or for the armies of the Union. We are always on the right side—namely, at the bedside of a man sick or hurt, whatever may be his nationality or race.

It is the devoutest hope of all of us that this country may be saved from war, but, should hostilities break out, we all know our duty. There is "one clear call" for us. We must arrange our work so that, directly or indirectly, we place our services at the disposal of the Government. Directly, we may do so by entering one or other of the organizations under the immediate control of the surgeons-general or, indirectly, by replacing other workers in order to free them.

Thanks to the foresight of Congress, there have existed since 1908 two bodies known respectively as the Medical Reserve Corps of the Army and the Medical Reserve Corps of the Navy. The members of these corps are selected because of some special experience or accomplishment fitting them to discharge particular functions allotted to them by the administration. It will thus be seen that in this respect the medical service of the United States army was in advance of the European armies, in which the need for the organization of specialist service was realized only sometime after the outbreak of hostilities. Of this corps some 1,500 have received training.

Immediately on the outbreak of war the regular army medical officers would be required wherever the regular army should go.

Furthermore, to fill the establishment, it would be necessary to draw to a certain extent on the Reserve Corps.

Nevertheless, the majority of this latter body would be available for several very necessary purposes. The most urgent of these would be the examination of recruits for the large armies that would immediately be raised, the training of newly joined medical officers, and the preparation of hospital corps and of other technical auxiliaries.

This leads us to refer to the deficiencies in the present establishment of the regular army. We learn from the surgeon-general that there are 230 vacancies in the Army Medical Corps at the present time, and that on July 1 next 232 more posts will be vacant, making a total of 452.

Some of the most important and brilliant contributions of recent times to the advancement of medicine—administrative, preventive, and clinical—and of surgery have been the work of this magnificent body of men. The career opened in this service is, therefore, as attractive as it is honorable.

It is to be hoped that the recent increase in recruiting will be paralleled by a movement of young physicians to inscribe themselves as candidates at the forthcoming examinations for commissions in the Army Medical Corps.

MORE OBJECTIVITY.

Paranoiacs of the eighteenth century were wont to lay their troubles at the door of dealers in witchcraft. At a later period the electromagnetic telegraph and electricity in general were inculpated; with the progress of science, each of its new manifestations was laid under contribution to explain the abnormal sensations of the person of unsound mind. We have all been familiar in the recent past with complaints of the malignant use of wireless telegraphy. It is not easy to see where will next be placed the responsibility, but the absent treatment specialists offer an inviting mark. This would be a reversion, for what is their practice but legalized—and commercialized—witchcraft?

We find the same phenomenon, if we consider the sayings of persons whose psychic condition is not pathologic, but whose minds have a kink and who are abnormal in the sense that their intellectual activities are engaged in the cultivation of fields remote from the average path, fields whose crops are mostly weeds. Witchcraft, hypnotism, magnetism, radiation have had their turn in the vocabulary of the mystic and of the student of the occult. There are signs that the turn of the ductless glands has come, for we now hear such persons speak of their ability to detect the vibration of the pituitary body.

This class is ever on the lookout for something sufficiently unknown and insufficiently investigated, and yet having enough of the sensational about it to fit it to impress the profane.

I am not unaware that this is not the first appearance of the pituitary body in the doctrines of mysticism. The interest of ancient mystics in this singular structure was probably due to the peculiarity of its position. Snugly ensconced in the hollow of the sella turcica, the hypophysis is the most protected, the least accessible of all bodily structures, and it is not surprising that in this seclusion there should have been seen something analogous to that of the innermost sanctum, the holy of holies, the cella of the deity in an ancient temple. Rushing in and dogmatizing where the ancients ventured only to speculate, the modern mystic affirms the pituitary body to be the very habitat of the soul. The associated appearance of the other ductless glands, however, in the conversation of the occultist shows that this resuscitation of interest in the pituitary body is but a part of the general phenomenon to which I have alluded.

The latest sensational development of science is requisitioned for instant service in the jargon of the occultist.

Nor is the medical profession exempt from the operation of this law. Witchcraft, magnetism, hypnotism, diathesis, autointoxication, pyorrhea, and many other cloaks for ignorance have been worn by pathologists up to the present day, when acidosis contests the field of fashion with dysendocrinism. A great deal of this has been mere hit-and-miss explanation. Sometimes the target has been so small that we remember more the misses than the few fortunate hits. Perhaps Metchnikoff's sour milk treatment is a good example of this. In other instances it has been so large that few misses have been made, and these are apt to be forgotten. Such a fortunate instance is the doctrine of the microbial origin of disease.

It is not quite fair to say that all this is a manifestation on the part of the profession of a desire to conceal ignorance. It is, on the contrary, often the result of a tendency almost wholly laudable—the desire to conclude. We are not easily contented to describe exactly what we see, merely to record our observations. We like to have at least the appearance of explaining. In his own time and place the prophet of theory has more honor than the collector of data. So, unwarned by the example of the philosophers, who have been turning intellectual catherine wheels in more or less closed orbits since the days of the first of them, we try to explain on too slender a statistical basis.

Now this, to be just to them, is all that the lunatic and the mystic are doing. When the lunatic says that he feels the radiation of the wireless telegraph that is being used to despise him, and when the mystic says he feels his pituitary gland or his "nervous centers"

in the limbs "vibrating," the error in each case is of the same order. It is an error of interpretation. In the second case the erroneous interpretation is part perverse—it is actuated by vanity. Were either to describe exactly what he felt, we should recognize the sensation as an ordinary experience of our own, and we should diminish our sympathy with or lose our veneration for the subject of it. This would confirm the lunatic in his ideas of persecution, and it would deprive the mystic of that satisfaction to his vanity which is the secret of so much inflated phraseology.

Phenomena of the same order in the field of scientific activity result in depreciation of the work of earlier generations; valuable data of really accurate observations are lost, merely because of a defective nomenclature, and present-day thinkers are led to regard with unjust contempt the efforts of their predecessors.

We want more objectivity even at the cost of our temporary and local rank as philosophers.

INFANTILE PARALYSIS.

Some epidemiologists have warned us of the imminence of an outbreak of infantile paralysis again this year, if not in the same localities as those in which it prevailed last year.

In this issue we publish an abstract and review of the recent literature of the subject by Dr. O'Reilly. This will be found a complete statement of the principal elements in the pathologic and clinical picture of this disease. Unfortunately the subject does not permit of this collective abstract being made into a critical review. This is due to the fact that although, at the end of the last season, indications of convergence—epidemiologic, pathologic, and therapeutic—were visible, they had not reached a stage in which a critical estimate of the various data could be made. We must, therefore, content ourselves with a summary of the accepted facts and some indication of the direction in which opinion is trending. With regard to the epidemiology of the disease, but little that is new and definite has been contributed. It is still believed that the distribution of the disease is determined by the routes of communication. The greater body of opinion holds that infection is by direct contagion by means of the nasal secretions and by the feces, and very little doubt is felt that persons may harbor the virus, becoming carriers, without experiencing any appreciable pathological effect. It is believed, moreover, that there is a large number of cases in which illness occurs, due to the specific agent, but in which infantile paralysis does not develop in a typical form. There has been no satisfactory confirmation of the specific role attributed in the etiology of this disease, to biting insects and in particular to the stable fly, though the possibility that flies may act as mechanical

carriers of infection has been demonstrated experimentally. Some workers have seen in rats agents for dissemination of the disease, while others have regarded several paralytic diseases of domestic animals as being of the same nature as poliomyelitis in man. This is discredited by Flexner and his school. The number of persons susceptible to the full pathogenic effect of the organism is considered to be small, and the soil therefore readily exhausted. Some confirmation of this is seen in two phenomena; first, the periodicity of the disease; second, the fewness of repeat cases in the same family (only about 3 percent). No attention seems to have been paid, in the literature, to the remarkable condition of subepidemicity of this disease, which has been shown by the public health returns of the state of Virginia during the last four years. An examination of the map shows that these cases are fairly well scattered, and one would have thought that the epidemiology of the disease might have been studied in that state under more favorable conditions than in the more congested areas, because the number of opportunities for and routes of infection must be fewer, and therefore more easily controlled.

Owing to preventive measures, in the uncertainty that still prevails as to the extent to which infection may be conveyed by other than the direct route from person to person, and of the difficulty of eliminating carriers, the "blunderbuss" methods which came in for so much adverse criticism in the course of the last epidemic find their full justification.

With regard to the pathogenic agent, the convergence of the results obtained by different observers is remarkable, and there seems now little doubt that the disease is caused by a pleomorphic coccus capable of cultivation in special media and filtrable in one of its forms. One set of observers claims to have isolated such an organism from the tonsil.

The early diagnosis of the disease is of such cardinal importance that it is satisfactory to note the almost unanimity on the subject of the early symptoms. This is reflected in the statistics, where we read that errors in diagnosis occur in only 1 percent of the total number of reported cases. All observers are agreed that there is a prodromal stage and that the disease is ushered in by sudden, high fever, which, though remittent, does not disappear for a considerable time. Equal emphasis is laid on the early occurrence of drowsiness, irritation, tenderness and pain in the neck. The majority of observers report nasopharyngeal symptoms, marked by sneezing, edema of the nasal mucous membrane and copious discharge. Sore throat is common, gastrointestinal symptoms are variable as are those referable to the nervous system, though some observers attach almost pathognomonic value to early disappearance of the patellar reflex. Lumbar puncture is desirable in the early

stage to establish the diagnosis, and it is, fortunately, also a therapeutic indication. The results are usually a leukocytosis, apparently at first an increase of polynuclear, followed by an increase of mononuclear leukocytes. All observers report an increase in the protein content, especially of globulin. The fluid is usually colorless, though later it becomes turbid; it reduces, promptly, Fehling's solution.

For treatment, lumbar puncture to relieve hydrocephalus is recommended by all, and there is an equal unanimity as to the necessity for the most nearly absolute rest obtainable. The drug therapeutics is largely expectant, and designed to overcome pain and restlessness; hexamethylenamine has not been abandoned. Emergencies of respiration and alimentation owing to paralysis may arise, and must be met. As regards specific treatment, serums of all kinds—normal man, normal horse, convalescent and immunized animal—have been tried. The most that can be said is that the results are not discouraging, and that from the last category we may soon look for the satisfactory specific treatment. The question of the after-treatment is much too complicated to be summarized here. Dr. O'Reilly's abstract gives all the indications that can be desired while the two articles by Drs. Baxter and Frauenthal expand the treatment of certain special aspects of this important subject.

THE COLLECTIVE ABSTRACT.

When a general medical journal comes under one's consideration, the first question that suggests itself is that of the special function by which it justifies its existence. When the editorial chair on the *INTERSTATE* was offered to me, this was the principal matter which I had to consider, nor was the answer far to seek. What the journal had done in the past was to be found by an examination of its files, what it intended to do in the future by a consideration of the publishers' announcement, a draft of which was shown to me.

Looking at the matter from an entirely detached point of view, the most notable achievement of the *INTERSTATE* in the past seemed to be undoubtedly the "Collective Abstracts." Since satisfying myself on this point I have been so often asked what is meant in our journal by a Collective Abstract, that I have thought it well to put on record our idea of the nature and function of this important feature.

There are three ways of abstracting medical literature: the first and simplest, so simple that it requires little, if any, professional knowledge, and is therefore generally adopted, consists in making the abstract of each article considered of sufficient importance and arranging these under the heading of periodical titles in chrono-

logical order. The second method, only a slight variant of the first, picks and chooses among the articles published over a period in various periodicals and then abstracts them in order of subjects.

The third treatment is that of the collective abstract, adopted by the INTERSTATE five years ago on the suggestion and initiative of a member of the editorial staff, who is still with us. In this method, the special subject having been decided on, the writer of the abstract proceeds to read critically practically the whole of the relevant literature, but, instead of merely offering it in the form of an uncritical review—of a condensed or canned food, so to speak—he blends it, predigests it, and gives you the finished product for your own use. In other words, he reviews the subject critically, not concealing the effect that is produced on his own mind, and yet placing before you the data on which his opinions have been formed. This calls for much conscientious labor and the competence of a specialist.

The value of such an audit by an expert can scarcely be overestimated. It is, therefore, the intention of the INTERSTATE to continue this department and to make it more and more the special characteristic of this journal.

In pursuance of this policy a change in the make-up of the journal has been adopted whereby the "Collective Abstracts" have been brought into a position immediately after the editorial articles, thus emphasizing their importance and their editorial character.

A NEEDED NEOLOGISM.

Our language has the reputation of being one of the richest, if not the richest, of European speeches in the matter of vocabulary. Sometimes, however, one discovers a gap. In writing the article which appears in this issue entitled, "More Objectivity," I was reminded of what has often been impressed on me, and that is that we have in our language no exact equivalent for that most useful French word, "constatation," and its verb, "constater." The meaning of this word is an observation of an objective fact made and noted in a formal manner without any attempt at interpretation or the formation of opinion. Usually in technical language, "constatation" is used in connection with the formal noting and observing of such a fact in the course of a proceeding *ad hoc*. In common language, however, while losing none of this precision, it has a somewhat wider meaning. The Frenchman will say, "je ne me plains pas, je constate"—"I am not complaining, I am constating the fact." As an example of the narrower use of the word, on the occurrence of a fire giving rise to a claim for damage, the proper authorities will come on the spot to make a constatation. We possess no such word in English, and we have no convenient

circumlocution for the idea it conveys though the verb "to constate" is used as a technical term in Scots law.

"Findings" seems to have had at one time a meaning closely approximate to "constatation," but, as is the usual fate of technical terms drawn from the vulgar tongue, it has lost its sharp edge and it is now used of the constataions, of the interpretation of them, and of the conclusions based thereon, as in "the findings of the jury." I think we want this word and its verb "to constate" in English. It is of good ancestry and comes to us with a clean record. It is a highly literate immigrant. Shall we not admit it to citizenship?

THE MORBIDITY OF PROSTITUTES.

In a recent number of *The Survey* the results of an examination of prostitutes at Cincinnati, on behalf of the Board of Health and the Antituberculosis League, are courageously discussed. These results show that in that town the amount of the incidents of tuberculosis among the inmates of brothels was by no means remarkably high. The general health of the inmates seemed to be fairly good. The author of the *Survey* article, Dr. Alice Hamilton, in concluding, says:

"Science every now and then surprises us by confirming some idea deeply rooted in the minds of the ignorant and vainly combated for years by the learned. Girls of the factories and workshops have listened with a polite and silent skepticism to the descriptions given them, by their religious instructors and by lecturers on social purity, of the dangers of a prostitute's life."

The truth is probably that we have not in the results of this investigation the whole of the story. To estimate the real danger of a life of prostitution, one must have the morbidity and mortality rate not only of those who have survived the first years of this life, but also of all who entered on it. The total risk of being born into a given community is not to be measured by the average health of the adult members. We must also know what was the infant mortality.

COLLECTIVE ABSTRACTS

LOBAR PNEUMONIA.

By ALBERT E. TAUSSIG, M. D.

Of all acute diseases prevailing in this climate, pneumonia is the most serious and most fatal, and the one responsible for the largest number of deaths, surpassing in this respect even tuberculosis. The Philadelphia pneumonia commission, in its recent report, states that, while the death rate from typhoid in Philadelphia has steadily fallen from 1,063 in 1906 to 111 in 1915, the death rate from pneumonia has remained practically unchanged, and in some years, indeed, has materially increased. In 1914 there were reported in Philadelphia 1,436 cases of pneumonia; in 1915 there were 2,744. In December, 1915, 881 cases were reported, the largest number in any one month. Even this large number does not indicate the real prevalence of the disease, for not only do many physicians fail to report their cases, but also the complications, especially meningitis, empyema, and middle ear disease, are reported instead of the pneumonia which is their cause.

BACTERIOLOGY.

Our present more intimate knowledge of the action of the pneumococcus and of the groups into which this microorganism may be divided is based chiefly on work done during the last few years at the Rockefeller Institute by Rufus Cole and his associates. The first accurate studies on this problem were made from 1909 to 1912 by Neufeld and Haendel. They prepared an immune serum from a single strain of pneumococci, and found that this serum was protective in mouse experiments against some strains of pneumococci, but not against others. A report by Dochez in 1912 at the Rockefeller Institute confirmed these findings.

Experiments were then undertaken to determine whether it would be possible to make a biologic classification of pneumococci obtained from cases of pneumonia, based on their reaction to different serums in protection experiments. Rabbits were therefore immunized to each of the races which were not acted on by horse serum, which we have called serum 1, and the protection afforded by these different rabbit serums against all the other races were tested. A considerable number were found to show cross-protection—that is, a serum prepared by injection of one of the number acted on all the races of this group. A horse was then immunized to one of this group, and the serum is called serum 2. In this way it had been possible to divide the pneumococci obtained from cases of pneumonia into four groups. In Group 1 are included all the races against which serum 1 is effective. In Group 2 are included all those against which serum 2 is effective. Whether the races included in this group correspond with the organism described by Neufeld, as acted on by his immune serum Franz, is not known at present. In Group 3 are placed all the organisms of the so-called pneumococcus mucosus type. The organisms have very large capsules and produce a sticky exudate in animals. In Group 4 are included all the races against which serums 1 and 2 are not effective, and which, from their other properties, do not belong in group 3. Animals may readily be

immunized to any member of this group 4, and the serum of the immunized animal is protective against the race used for immunization. In no instance, however, has this serum been found effective against any other race of this group or against the organisms of the other groups. So far as cultural and morphologic characters are concerned, no constant group differences have been discovered between the members of groups 1, 2 and 4. By means of the agglutination reaction, however, it has been found possible to group them in exactly the same manner as by protection experiments.

The races placed in groups 1, 2, and 3 seem to be fairly definitely marked. Group 4 is a catch-all, into which have been placed all the races that do not belong to the other three groups. It is a heterogenous group, in that each race, so far as studied, appears independent and does not react to any immune serum except its own. It has, however, one important characteristic—an almost uniformly low virulence. Thus, while in the series reported by Cole the mortality of cases due to groups 1, 2, and 3 was respectively 24 percent, 61 percent, and 60 percent, that of cases due to group 4 was only 7 percent, only one case out of the 15 studied having died.

CARRIERS.

It has long been known that the pneumococcus is an almost constant inhabitant of the upper respiratory tract in health, and it was assumed that an attack of pneumonia resulted from an invasion of the pulmonary tissue by these ordinarily innocent denizens of the throat whenever, for some reason, the patient's resistance became lowered. Recent work will, however, apparently force us to modify this view. The pneumococcus found in the throat of healthy individuals who have not come in contact with pneumonia patients is an avirulent microorganism, which, since it does not belong in any of the first three groups, must be classified with group 4. This entire heterogenous group is, however, responsible for only about one-fifth of all cases of pneumonia, so that autoinfection will account for only a small proportion of the cases. Healthy persons who have been in contact with pneumonia patients show a very different bacteriological picture. Dochez and Avery in 1915 and Stillman in 1916 have reported studies of such individuals. They state that, whereas pneumococci of types 1 and 2 are responsible for the majority of cases of pneumonia, they are hardly ever found in healthy persons who have not recently been exposed to the disease. On the other hand, from a total of 41 cases of lobar pneumonia due to the virulent types of pneumococci, 5 gave rise to a carrier condition in at least one of the immediate associates of the patients, and 6 percent of the 84 contacts examined showed virulent pneumococci in their sputum. Moreover, convalescents from pneumonia carry for a considerable time in their upper respiratory tracts the type of pneumococcus which was responsible for their disease. Pneumonia must therefore be considered an eminently contagious disease, the contagion being spread in three ways—by contact with the patient, by contact with an associate of the patient, and by contact with a convalescent. Efforts toward prophylaxis have thus at last a rational basis.

SKIN REACTION.

Any discussion of the signs and symptoms of pneumonia would obviously carry us too far in a review of this kind. A cutaneous reaction described by Weil, however, deserves mention, even though its diagnostic importance is negligible. If a pneumococcus toxin, prepared by means of autolysis, is injected into the skin, the injection is immediately followed by a superficial, ill-defined cutaneous blush. This erythema fades within a few hours, and, if nothing further develops, the reaction is considered negative. A positive

reaction is characterized by the appearance, within twenty-four hours, of a papule at the site of injection, surrounded by a well-circumscribed area of erythema, both persisting for forty-eight hours or more. Unfortunately this reaction does not appear early in the disease, and is often not to be observed until convalescence has set in. It may perhaps be of practical importance in the interpretation of the *segnelæ* of a doubtful case of pneumococcus infection.

BLOOD PRESSURES.

It has long been considered almost axiomatic that many of the grave symptoms and a large number of the deaths in pneumonia were directly due to failure of the circulation. The best gauge of the condition of the circulation was considered to be the behavior of the blood pressure, a view that was most precisely stated by G. A. Gibson, of Edinburgh, in what is known as "Gibson's" rule. "A pressure," he said, "appreciably below the normal in pneumonia is invariably of evil omen, and any considerable fall bodes disaster. When the arterial pressure, expressed in mm. Hg., does not fall below the pulse rate expressed in beats per minute, the fact may be taken as of excellent augury, while the converse is equally true." H. A. Hare, in a number of papers, has expressed the same view. He advised that the systolic blood pressure and the pulse rate be charted on the same sheet. Whenever the two curves approached each other, vigorous digitalis medication was indicated; when they crossed each other, the prognosis became very grave. Recently he has expressed himself less positively in this respect, but on the whole this has been the general attitude of clinicians. The most recent publication to indorse this view is that of Tice. Excluding cases in which extraneous factors, such as nephritis, myocarditis, and obesity entered, nearly all of his pneumonia patients followed Gibson's rule. Aside from its prognostic significance, the blood pressure and pulse rate ratio has been to him "of the greatest assistance and satisfaction as a guide to the administration of cardiac stimulants."

The work of Newburgh and Minot, at the Massachusetts General Hospital, indicates that this view must be modified. They found, in the material studied by them, that the systolic pressure in the fatal cases was continuously above the systolic pressure of the persons who recovered. They are, consequently, unable to accept Gibson's dictum that "a pressure appreciably below the normal is invariably of evil omen." Moreover, the diastolic pressures of the recoveries showed a slight but progressive fall, while the systolic pressure remained very nearly level. This resulted in an increasing pulse pressure as the crisis was approached. The fatal cases showed a slight tendency in the opposite direction. They conclude that blood pressure measurements in pneumonia cannot be used as a basis for treatment nor for prognosis.

These results are the less surprising in view of the very interesting experimental work done during the last few years by W. T. Porter and his pupils. They injected sufficiently massive doses of Friedlaender's bacillus or of the pneumococcus intratracheally into dogs and cats to produce typical lobar pneumonia, and studied the resulting circulatory and respiratory phenomena. They found that the general belief that the disease specifically injures the heart and the vasomotor apparatus is mistaken. Even in fatal cases, about to die, the vasomotor reflex remains normal and the blood pressure is not seriously depressed. That the heart musculature is not gravely injured is shown by the observation that, if the hearts of animals recently dead of pneumonia be excised and perfused with normal blood or its equivalent, they again begin to beat and continue for a time to do so, just like the hearts of normal animals. The respiratory center, on the other hand, is gravely impaired. Animals dying of pneumonia usually cease breathing while the heart is still beating, and such animals may be kept alive for some time by artificial respiration. The

activity of the respiratory center can best be tested by making the animal breathe air containing increasing percentages of carbon dioxide (1 percent to 5 percent). In health, the greater the CO₂ content of the inspired air, the greater the respiratory excursions. In pneumonic animals this parallelism fails. The animal no longer responds with deeper respirations, as the CO₂ content of the inspired air is increased, and this loss of reaction on the part of the respiratory center becomes more marked the graver the pneumonic intoxication. It may be that these observations on animals cannot be directly applied to human pneumonia, but they should serve to direct our attention to the respiratory mechanism in this disease rather than to the circulatory apparatus.

COLD AIR TREATMENT.

A long chapter might be written on the treatment of pneumonia, but, aside from the treatment of complications, what is really of value can be summed up very briefly. Ever since the advocacy by Northrup of the cold air treatment of pneumonia, some ten years ago, this method has been gaining in favor. No one who has seen the almost miraculous improvement manifested by such patients, when the windows are thrown wide open on a wintry day, or, better still, when they are moved out of doors, can fail to be impressed with the value of the treatment. In asthenic and especially in the afebrile cases, common in the aged and in alcoholics, the method may need to be used with caution, and it may be that the same is true of children. Even in the latter, however, recent opinion favors the cold air treatment. Freeman, in his recent presidential address before the American Pediatric Society, said: "In all the acute infectious diseases I think there is now a general acceptance of the advantage of fresh air, excepting perhaps in measles and scarlet fever. In tuberculosis there is now no question of its advantage. In pneumonia the results from this treatment have exceeded those from any other method of treatment, including specific treatment with serums and vaccines." Morse and Hassmann have studied the effect of cold outdoor air on children sick of pneumonia at the Children's Hospital in Boston. They were not able to confirm the previous observations of Howland and Hoobler, in 1912, of the constant stimulating effect of cold air on blood pressure in this disease, but were definitely impressed by the general subjective and objective improvement in the patient's condition when placed out of doors.

AUTOLYSED PNEUMOCOCCUS EXTRACT.

Rosenow has noted for some years the apparent beneficial effect from the early subcutaneous injection of large doses of partially autolyzed pneumococci in the treatment of lobar pneumonia, and Rosenow and Hektoen have lowered the mortality rate in cases of lobar pneumonia in Cook County Hospital, Chicago, for three consecutive years by the administration of partially autolyzed pneumococci to alternate patients. In a recent communication Rosenow and Falls report further results with this treatment in the same hospital. There was no selection of cases, every patient being injected as soon as the diagnosis of lobar pneumonia could be made clinically. The injection was occasionally followed by a chill, and usually by a temporary rise of temperature. The latter then fell from 2 to 6 degrees, and though it subsequently rose again, the temperature usually continued somewhat lower than before the injection. Of all 35 cases studied, only 6 died. Of these, 5 had used alcohol to excess and the one nonalcoholic had a streptococcus mucosus pneumonia. The method is obviously not ripe for general use, but promises much for the future.

ETHYLHYDROCUPREIN.

The only drug whose value in the treatment of pneumonia rests on an experimental basis is ethylhydrocuprein (optochin). Ethylhydrocuprein itself is insoluble in water, and is injected intramuscularly suspended in oil. Its salt, ethylhydrocuprein hydrochloride, on the other hand, is very soluble, and may be injected hypodermically or given by mouth in capsule. Morgenroth, in 1911, was the first to study its inhibitory effect on pneumococci. Wright, a year later, found that the serum of animals who had received injections of the drug had a marked bactericidal action on pneumococci and only on pneumococci. Since then it has been studied by many bacteriologists, but most exhaustively by Morgenroth and by Moore. They found that in a dilution of 1:1,000,000 ethylhydrocuprein often kills the pneumococci, and in a dilution of 1:500,000 always does so. Much weaker dilutions suffice to inhibit its growth. According to Morgenroth, 90 to 100 percent of mice who received the drug soon after the injection of a lethal dose of pneumococci were saved. Indeed, they often survived if the ethylhydrocuprein was given twenty hours after a dose which would otherwise have been inevitably fatal within forty-eight hours. Moore was unable to obtain quite such striking results. He found, however, that of 85 mice treated by ethylhydrocuprein, after receiving 100 times the lethal dose of pneumococcus culture, only 17.6 percent died of pneumococcus sepsis. Of these animals, however, 15.2 percent died from the toxic effects of the drug, while the rest survived.

The protective dose in animals has thus often overstepped the toxic dose. Such a dose for human beings would correspond to 30 grams for a man weighing 140 pounds, and is obviously not permissible. Much smaller doses have produced constriction of the retinal vessels, with complete and sometimes permanent blindness. The latter is, however, only temporary if the daily dose does not exceed 2 or 3 grams. Moore has shown that, after the administration of 0.5 grams by mouth, the serum of human beings has a marked inhibitory and bactericidal effect on pneumococcus cultures, but to a less degree than when corresponding doses are given to rabbits hypodermically. No considerable statistical reports of the influence of ethylhydrocuprein are as yet available, but the results are, to say the least, encouraging. Miller states that, by general agreement, the best method of administering the drug is to give 0.25 grams in capsule every hour up to a daily dose of 1.5 grams.

ANTIPNEUMOCOCCUS SERUM.

The serum treatment of pneumonia has been extensively studied both in Germany and at the Rockefeller Institute in this country. The relative failure abroad, as contrasted with the successful results here, is due to the fact that in Germany the experimenters have used sera derived from single strains of pneumococcus in all cases of pneumonia, whereas at the Rockefeller a sharp distinction has been drawn between infections with the four different types of pneumococcus. Animal experiment shows that serum treatment with group 4 of the pneumococcus is eminently successful. But as this group consists of a vast number of different strains, each of which responds only to its own antiserum, the treatment is not practicable in man. Group 3, apparently on account of its mucous envelope, is entirely resistant to serum treatment. This leaves only groups 1 and 2 as amenable to this therapeutic measure, but fortunately these groups are responsible for the majority of human cases.

The serum must be given early and intravenously. At the Rockefeller Institute, 0.5 c.cm. is first given subcutaneously to discover whether the patient is hypersensitive to horse serum, and, if so, to induce antianaphylaxis. Meanwhile a culture is made from the patient's blood and also one from a portion

of sputum coughed up from the lung, or, when this is not obtainable, a culture is made directly from the lung by the insertion of a needle. This procedure seems to be without danger. When there are large numbers of organisms in the sputum, a culture may be obtained most rapidly by injecting the washed sputum into the abdominal cavity of a mouse. After four or five hours the peritoneal cavity may be washed out with salt solution and the cells thrown down in the centrifuge; a suspension of the organism is thus obtained. In whatever way the culture is obtained, the agglutination test is at once applied. If the organism fails to agglutinate with either serum 1 or serum 2, it is, of course, useless to undertake serum treatment. If, however, one of the serums agglutinates the organism, treatment may be commenced at once with the appropriate one. An intravenous injection of 50 to 100 c.cm. of serum diluted with an equal amount of physiological salt solution is given and may be repeated every twelve hours.

In maximum infections no serum appears to be of avail. Apparently it is necessary for success that the body furnish some elaborating substance. Kolmer suggests that the body may be deficient in bacteriolytic complement, and that it may be advisable to add 5 c.cm. fresh sterile guinea pig serum to each 100 c.cm. immune serum just before administration.

The results, while as yet limited in number, are definitely encouraging. At the Rockefeller Institute the mortality of cases due to type 1 of the organism has been 6.6 percent in treated cases as compared with 24 percent without serum. Type 2 has shown a mortality of 25 percent when treated with serum as compared with 61 percent untreated. Cole, therefore, expresses the opinion that type 1 cases will prove most amenable to the treatment.

In general practice it will not often be practicable promptly to identify the type of organism responsible for the disease.

At the meeting of the Congress of American Physicians and Surgeons in Washington last May, Park and Cole disagreed as to the advisability of administering an antipneumococcus serum without first identifying the type of organism responsible for the infection. The former pointed out that in private practice the necessary laboratory facilities were not always to be had, and that even in a well-equipped hospital the delay involved in waiting for the bacteriologist's report would impair the value of the serum injection. He advised giving every pneumonia patient an immediate injection of type 1 serum. Before the second injection becomes due the bacteriologist's report should be at hand, and from this the advisability of repeating the injections can be determined.

Cole strongly deprecated any such compromise with hit-or-miss methods. He urged that, since type 1 pneumonias make up only one-third of all cases, two out of every three patients treated as Park advised would be receiving serum injections without any possibility of benefiting thereby. Such methods would merely result in discrediting serum therapy.

Perhaps the solution of the controversy may be hoped for the production of a polyvalent serum, from animals immune to at least type 1 and 2. Such a serum has recently been put on the market. Before it can be generally accepted, however, it should be investigated and indorsed by some independent bacteriological institution, and each vial should be dated and should have on its label a statement as to the immune units present in the serum. Otherwise the physician can have no knowledge of what he is really giving his patient. Even though it be useless in cases due to type 4 (usually very mild in character), or to type 3 (fortunately rather rare), the fact that it is applicable to nearly two-thirds of all cases will justify its general use. The one prerequisite, as in all serum treatment, is that it be given early and in sufficiently large dose.

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RECENT STUDIES ON FACTORS INFLUENCING MAINTENANCE AND GROWTH.

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Within the last ten years much has been accomplished in the direction of determining the value of various food substances and their influence on growth and maintenance. Since the time when our attention was drawn to the fact that foods may serve to produce energy or to produce tissue, it has been realized that they serve several purposes, and that certain foods serve one purpose better than they will serve another. Efforts to determine exactly the value of either specific whole foods or of the various individual components which, when combined in the native food substances, serve to nourish the individual, have been extensively carried out only within the past ten years. With this work the names of Osborne and Mendel, McCollum, Funk, and, more recently, Robertson are associated; abroad, the name of Abderhalden has also been associated with this work, but his experiments were carried out in the earlier stages of the investigations and there has been little or no recent publication of work on this field in foreign countries.

It is well, first, to make clear certain differentiations which are constantly used in connection with this work on food values. The investigators, as a rule, distinguish the power of a certain diet or food to permit or to stimulate growth from the power of another diet to maintain the size or the weight of the animal. Or, in other cases, a difference may be made between the adequacy of a given diet to maintain the animal and the adequacy of the diet to permit the animal to bear young. A further difference may be made as to whether the diet will suffice to permit the bearing of young and in addition will permit the rearing of these young, either with or without the maintenance of the original weight of the mother. It may be seen, therefore, that there are several criteria of the value of the various diets, and to say that a certain diet is insufficient, without further qualification as to the respect in which the diet is inadequate, would not give much real information.

In discussing the recent work which has been done in this field, it will, of course, be necessary to refer to some of the earlier work of these investigators, and in such cases we will refer to this without attempting to give references in the text. Since each of the groups of men have attacked the problems from a somewhat different point of view, and have developed theories which, while they agree in the main, do differ in slight details and especially as regards terminology, it appears most reasonable to consider at first the work of each group separately.

In many respects the work of McCollum and his collaborators is more simple than that of some of the other groups. According to the belief of McCollum, there is required for a fully adequate diet the presence of proteins, fats, carbohydrates, certain mineral substances, and, in order to insure both growth and maintenance, two substances, the fat-soluble "A" and the water-soluble "B," both of these latter substances of an unknown nature.

McCollum, Simmonds, and Pitz have analyzed in the light of their theory the deficiencies of a diet of "wheat embryo" when fed to rats. They find that there are present in the "wheat embryo" all of the substances necessary for a completely adequate diet, but it is evident that the substances are not present in correct proportions, as the animals do not thrive upon such a diet.

The proteins were of the necessary varieties; the water-soluble substance "B" was present in large quantities and the fat-soluble substance "A" in moderate concentration. It appeared, however, that the mineral contents were either insufficient or lacking in certain elements. By adding a known mixture of various salts, the animals were able to thrive on a diet of wheat germ. They further found that there was a toxic substance present in the wheat germ which could be extracted from it by ether, and was therefore contained in the fat fraction. Whether the toxic substance was a fat or whether it was simply bound to the fats was left for further investigations.

In a similar manner they have investigated the deficiencies of the maize kernel, which, when fed alone to rats, will not suffice to maintain the weight or permit the growth of the animals. The proteins of the maize contain all of the amino-acids which have been shown to be necessary for the growth of animals, but the proportions of these are not such that they can be utilized, and maize will not serve as the sole source of proteins. If all other ingredients in the diet are normal, one can, by feeding 91 percent of maize, get two-thirds the normal growth for a period of six to seven months, but after this period the animals will fail. It is therefore necessary to add certain purified proteins to the maize diet. The maize kernel contains both the substances "A" and "B," but too small an amount of the former. It is therefore necessary to add some substance which contains this ingredient, and for this purpose butter fat was used. The animals thrive for some months even without the addition of the butter fat. It is possible to maintain the animals for a somewhat longer time on a diet of maize if additional quantities of the substance "B" are added, even though the maize kernel contains sufficient of this substance to permit the animal's continued growth. It is further necessary to add inorganic constituents to the maize diet in order to maintain the animal indefinitely.

It is therefore necessary to add to the maize purified proteins, butter fats, and salts in order to make a diet composed chiefly of maize adequate to permit physiological well-being of the animal throughout life, as well as the normal reproduction and nourishing of the young. Without the addition of all three of these factors, a diet of maize will fail.

Similar results have been obtained in former experiments in which young pigs were fed upon a diet of maize kernel. It was also evident that certain proteins and inorganic salts were lacking in the diet of pure maize kernel.

In further investigations, McCollum, Simmonds, and Pitz found that no diet in which the wheat kernel furnished the entire protein was adequate for the rearing of young. If 10 percent of casein, which contains adequate proteins, was added to the diet, there was marked improvement, but the protein was still not satisfactory, and there was still evidence of the toxicity of some substance in the wheat. When the casein was used in large quantities and the wheat in relatively small quantities, the rats could not rear the young, probably because of the lack of the water-soluble substance "B." If wheat was used in the quantity of 15 percent as a source of "B," the animals grew, reproduced, and raised the young, but the latter showed nervous symptoms, which eventually led to the death of the young. In these experiments it has been shown that an increased quantity of low value protein will not serve the same purpose as a smaller quantity of a higher value protein.

In the experiments of McCollum and Kennedy and those of Hart, Miller, and McCollum an effort has been made to analyze the factors producing the lesions or pathological conditions resulting from deficiencies in diet. In swine a diet composed in a large mass of wheat produces malnutrition, which is manifested histologically by nerve degeneration. This is, as stated above, due in part to deficiencies of the wheat and in part to an inherent toxicity

of the wheat. It is not possible to overcome this by replacing only one of the deficient factors, but all of them must be replaced—proteins, salts, and the fat-soluble "A." It is also possible to overcome the toxicity of the wheat by additions of several complex substances, such as alfalfa and meat scraps, or possibly sufficient quantities of milk. It is known that a polyneuritis can be produced in fowls by feeding polished rice, and McCollum and Kennedy have found that, by adding to the diet the constituent which they call the fat-soluble substance "B," they can prevent this from appearing. They furthermore noted that it is possible to maintain animals for a longer period without the water-soluble substance "A" than without the fat-soluble "B." It should be recalled that Funk considers that the absence of a certain substance which he called a "vitamine," and could extract from the polishings of the rice, was responsible for the development of the polyneuritis.

McCollum, Simmonds, and Pitz studied the influence of the substance "A" and "B" upon the ability of rats to nourish their young. If both "A" and "B" were lacking, or if the proteins in the diet were lacking, the mother sacrificed her tissues to maintain her young, and even so the young grew but poorly. Very much the same result was noted if either "A" or "B" were lacking, and therefore it seems that all of the elements into which McCollum and his followers have divided the diet are required to permit the fullest physiological activity of the animal.

Turning now to the work of Osborne and Mendel, we find that they have recently analyzed the relative value of certain isolated proteins for growth and maintenance. They fed their rats diets composed of the specified protein, starch, protein-free milk (which contains both mineral constituents and certain necessary fats or lipoids), and lard. Lactalbumin proved to be the most efficient for both maintenance and growth, casein was required in 50 percent larger quantities in order to give results equal to those of the lactalbumin, and edestin was required in 90 percent larger quantities. If the amino-acid cystin, which is lacking in casein, and which is apparently, according to earlier experiments, necessary for the continued growth of rats, was added to the casein, the efficiency of this protein was equal to that of the lactalbumin.

In further experiments, Osborne and Mendel investigated the minimum of lysine and tryptophane, which, in addition to cystin, are necessary for growth. They found that the rate of growth increased with an increasing quantity of these amino-acids until the normal rate is reached, but when more of these substances are now added, there is no further increase of the rate of growth. Growth up to the normal is limited by the deficiencies of the diet, but beyond this point the rate is dependent on the natural capacity of the animal to grow. It was not possible to demonstrate whether the animals would grow without lysine, as the "protein-free milk" contains a small amount of this substance, but the need for lysine was not as great as for tryptophane. Lysine does, however, seem to have a conserving effect as at least a partial substitute in cases where the tryptophane is present in rather too small quantities, and, furthermore, it appears that at least 2 percent of the protein must be present as lysine in order to permit growth.

These same investigators, as well as others, had found that certain fatty substances were necessary in the diet to maintain the animals. These special fats were present in butter fats, and the oil fraction of butter fat also contained the specific substance. No such substance was present in lard, and it had been claimed that here it had been destroyed by the heat to which the lard was exposed. Osborne and Mendel, however, showed that heating butter fat in live steam did not injure the substance, and McCollum and Davis had shown that saponification of the fat did not destroy the efficiency. The first-

named pair also determined the stability of these substances when the butter fat or the oil fraction were kept for some time. They found that the oil gradually lost its activity after about two months when kept in the light, and also lost activity, but more slowly, when kept in the dark and at a relatively low temperature. The butter fat, however, was still active even after fifteen months.

Funk, who calls the growth-promoting and health-preserving substances which are indispensable in a diet, "vitamines," has shown that these so-called vitamins will cure experimentally produced polyneuritis in fowls, and that certain other vitamins will cure an experimentally produced disease in guinea pigs which in some features resembles scurvy. He has studied the influence of an exclusive diet of oats in rabbits, guinea pigs, and rats, and finds that the rabbits sicken and die, but may be aided by the administration of sodium carbonate, but not by the administration of antiscorbutics. He therefore believes that the rabbits die as a result of acidosis. Guinea pigs also sicken on this diet, but are effected neither by alkali or by antiscorbutics. Therefore, although the symptoms produced in guinea pigs by this diet are similar to those of scurvy, Funk concludes that the disease is not identical with human scurvy. Rats finally do not react in the same manner to a diet of oats as do the other two species, but will live for quite some time on oats. Young rats, however, will not grow on an exclusive diet of oats. Yeast, one of the substances from which Funk has obtained vitamins, cannot be substituted for casein in a diet for young, growing rats, and this may be due to the toxicity of yeast. If orange juice, an antiscorbutic, is substituted for yeast, the rats do not grow. This would seem to bear out Funk's theory that there are different vitamins which have separate and distinct actions. He recommends as a full diet for rats, oats, bread, condensed milk, and yeast.

Funk and Macallum have compared the value of a diet of yeast and lard with a diet of yeast and butter fat. On the former ration the rats fail to grow and develop scorbutic symptoms, which may be relieved in part by moistening the yeast. The addition of butter fat will usually, but not always, relieve these symptoms. Yeast is, however, not an ideal food substance, since it contains toxic substances, the action of which becomes evident in experiments of long duration. These same observers have shown that there may be extracted from yeast not only a vitamin acting against beri-beri, as shown in Funk's earlier experiments, but also a different vitamin which is growth-promoting, and which is less stable than the former.

Funk, Lyle, and McCaskey have tested the value of a diet of yeast, polished rice, and white bread as a diet for humans, and, though the experiments have not been sufficiently extensive to permit any broad conclusions, a few facts can be drawn from them. Yeast cannot be recommended as a sole protein source, since much of the yeast protein has no food value and is poorly assimilated; even when a vitamin was added to this diet, it was not possible to get a positive nitrogen balance in the individual.

More recently Robertson and his coworkers have entered on the investigation of the problems of growth, and their interest has lain rather in the investigation of the effect of certain substances in stimulating growth. They have used white mice in their work, and noted first the normal curve of growth. They note three cycles of growth, the most important of which is the third cycle, beginning during the fifth week, reaching its maximum at the sixth week and continuing even up through the fiftieth or sixtieth weeks. They also consider the influence of the diet on the variability of the increases of weight of the individual mice in a series.

In feeding to the mice the anterior lobe of pituitary body, the growth of the mice is retarded during the early part of the third cycle of growth up to

about the twentieth week. From this period onward, however, the growth of the mice is accelerated, and at one year the mice fed on pituitary may surpass the normal mice in weight. The variability of the increase in weight of the individual mice is diminished in those fed on pituitary substance, and these mice are also more compactly built than are the normal mice.

Robertson has also extracted from the anterior portion of the pituitary a substance which he calls "tethelin," and which he claims to be the growth-promoting substance of the pituitary body. The effect of feeding mice this substance was practically identical with that produced by feeding the entire anterior lobe, except for the fact that very much smaller quantities of tethelin were sufficient to stimulate growth in the later period of the third cycle. Similar effects upon variability and body structure were also noted.

Cholesterol also slows the body growth of mice in the early part of the third cycle, but the mice fed on cholesterol tend to reach the normal weight toward the sixtieth week. This action of cholesterol is similar to that of tethelin, but very much larger quantities of cholesterol were required to produce the same effect. Furthermore, while cholesterol increases the variability of the weight of the individual mice, tethelin diminishes this, and feeding cholesterol does not lead to a more compact and stocky body structure as does tethelin. Lecithin, which retards the earlier stages of development of sea-urchin eggs and also the growth of inoculated cancers, has practically no effect on the growth of mice. Slight differences were noted between lecithin from egg and that obtained from pituitary; the latter caused the weights of the individual mice to vary less than did the former.

When a suckling mother was fed lecithin, there was noted a slight retardation of the rate of growth of the young. Cholesterol produced the same effect, but to a more marked degree. Whether this effect was a direct one resulting from the secretion of these substances in the mother's milk, or whether it was indirect, due to some action of the substances fed upon the mother, is not definitely determined.

Robertson tested whether cholesterol could replace fats in a diet for mice. He found that, on feeding mice a diet deficient in fat, they first lost weight, then resumed growth, but at a retarded rate, but finally showed a marked fall in weight and eventually would die. When cholesterol was added, the initial loss in weight was prevented, but the weight curve was otherwise unchanged from that which had been noted when a fat-deficient diet was given. It seemed therefore that, on either a fat-deficient diet or a diet where fats were replaced by cholesterol, growth was possible, but maintenance was not. The decline of weight took place at an age when the velocity of growth is insufficient to compensate for the deficient ability of the tissues to replace the current loss.

Mitchell has fed mice on isolated amino-acids, and finds, much as did Osborne and Mendel, that tryptophane is essential for the maintenance of the animals, whereas tyrosin and phenylalanine are not indispensable. There was contained in the diet which Mitchell used also sufficient carbohydrate, fat, and mineral substances.

Hogan has tried to determine the truth between the different results, or rather explanations, of Mendel and Osborne on the one hand and Forbes on the other as regards the deficiency of corn as a nutriment. The former claim it to be due to the deficiency of the corn protein, zein, in certain amino-acids, while the latter believes it to be due to deficiencies in mineral substances. Hogan used rats in his experiments, and found that the addition of the lacking amino-acids, lysine, and tryptophane did not increase the efficiency for growth. The addition of adequate protein, such as egg white, was only of slight benefit; the addition of casein was of slightly greater benefit. Hogan believes that the inadequacy is dependent on a lack of sufficient of the "accessory substances,"

such as the fat-soluble substance "A" or the water-soluble substance "B," or possibly substances like the vitamins. Since swine will grow on a corn diet, it would appear that corn contains enough accessory substances for the growth of the swine.

Summarizing all of these experiments, we find, of course, that certain of the older ideas are upheld—namely, that a diet, to be adequate to sustain life, must contain carbohydrates, fats, and proteins. It is, however, not sufficient that any protein be used, and we must use a protein which contains amino-acids, necessary for the continued growth of the animals, such as cystine, lysine, and tryptophane. It is further necessary that these amino-acids be present in sufficient quantities, and probably in correct relative proportions. It is at least suggested that a combination of several proteins is more efficient than one single protein, especially when fed over a long period of time.

Beyond these three basic substances, which are necessary for the maintenance of the animals, it appears that inorganic substances are necessary for the animals, and, if these are not present in the diet in correct proportions and sufficient quantities, serious disturbances will arise in the animals.

Finally, as far as the diet is concerned, certain additional substances are indispensable, and these are the so-called "accessory substances" of Osborne and Mendel, which they find in either butter fat or similar substances, the fat-soluble substance "A" and water-soluble substance "B" of McCollum, or the "vitamins" of Funk. These as yet undetermined substances are evidently necessary for not only maintenance, but also for growth of the animals. Whether the different names applied by the various investigators imply different composition of the various substances is not known at the present time, but it seems probable that we are here dealing only with different names for either identical or very similar substances.

We also may state, as a conclusion to be drawn from these experiments, that it is evident that the needs of different species of animals for the various substances stimulating growth, or for the various food substances, vary, so that we may not conclude from the results of experiments carried out with one species what the result of a similar diet will be in another species. We must also sharply differentiate diets which are adequate for growth, maintenance, reproduction, and finally for the rearing of healthy young, and it is possible that certain of the accessory substances are required in different proportions in order to successfully enable the animals to carry out these physiological functions.

It seems from Robertson's experiments that there is in the pituitary body a substance which corresponds at least in certain effects with the accessory substances, although its effects are not identical, and, furthermore, that this substance can be isolated.

While the experiments have not been carried out on humans, and, as stated above, cannot be directly applied to the questions of the needs of humans for either specified food substances or growth-stimulating substances, these experimental results certainly suggest many fields and lines of investigation in connection with malnutrition in humans, and at least some possible explanations of some observed facts.

Finally, it must be borne in mind that some of the pathological conditions produced in animals which are similar to certain nutritional diseases in humans, and to which the specific name of the disease as it appears in humans has been applied, as probably not identical with the conditions in man, and therefore should not be called by the name applied to the human disease, or at the least a mental reservation should be made in using this name.

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ACIDOSIS, WITH PARTICULAR REFERENCE TO CHILDHOOD.

By BORDEN S. VEEDER, M. D., of the Editorial Staff.

Among the various problems of interest to the physician whose practice is of such a nature that he is called on to work with children, perhaps none has been so thoroughly studied in the past year as that of acidosis. A certain equilibrium between the acids and bases in the blood and tissues is essential to life, and under normal conditions the degree of fluctuation of this equilibrium is narrow. Associated with various pathological conditions, greater degrees of fluctuation occur between the acids and bases, and, when an accumulation of acids takes place which depletes the store of available neutralizing bases, the condition may be defined as acidosis.

"This term," says Frothingham in the opening paragraph of a paper on acidosis, "as it is used in medicine at the present time, does not designate a definite clinical entity, but is applied to a variety of conditions in which there is a general impoverishment of the body in bases or substances which readily give rise to bases. This impoverishment in bases may be due to faulty absorption of bases, to an unusual loss of them from the body, or to their neutralization by abnormal amounts of acids. Increase in the amounts of acids in the body may be due to the production of abnormal acids, an overproduction of the usual body acids, or to an accumulation of normal acids due to failure in excretion."

The most important substance in the blood which, under normal conditions, neutralizes accumulating acids is the bicarbonate. When there is a slight or minor degree of acid accumulation in the blood, insufficient in itself to produce clinical signs, the degree of acidosis may be measured by determining the amount of alkaline (bicarbonate) reserve in the blood. When the store of reserve alkali is used up, clinical signs, as hyperpnea, develop. Normally there is a constant production of acid (CO_2) in the tissues of the body, which is carried to the lungs and gotten rid of by pulmonary ventilation. When, as during work, an excessive amount of carbon dioxide is formed in the body, the respiratory centers are stimulated, an increase in the respiratory rate takes place, and increased pulmonary ventilation results. When an excessive formation or accumulation of acid radicals other than CO_2 takes place, which leads to a depletion of the alkali normally present, a lowering of the CO_2 tension of the blood occurs, and, when sufficient acid has accumulated, to an increased respiratory rate, or hyperpnea.

METHODS OF EXAMINATION.

Several methods for determining the presence of an acidosis are in use at the present time. The blood and urine may be studied directly, or a study of the products of respiration may be made. An indirect method is to determine the amount of alkali required to render the urine alkaline. The different methods are but different means of approach to the same general problem.

It is well known that the carbon dioxide tension of the blood decreases when an accumulation of acids in the blood occurs, and the estimation of the CO_2 content, therefore, offers an indirect method of determining the degree of acidosis present. Two methods which have recently been devised utilize this

principle. One is the method of Van Slyke, in which the CO_2 content of the blood is measured by means of a special apparatus, and the other method of Marriott, in which the CO_2 tension of the alveolar air is determined by passing alveolar air through a carbonate solution containing an indicator, and reading the tension in millimeters of CO_2 by comparison with a color scale. The first requires the collection of a sample of blood, while the value of the second depends on the accuracy of the collection of the sample of alveolar air, which at times is extremely difficult, and especially so with those conditions in which the test is of most clinical value. It is our experience that the Van Slyke method is preferable in working with children.

A direct method of estimating the acidity is by determining the hydrogen-ion concentration of the blood by the method of Levy, Rowntree, and Marriott, or of the urine by the Henderson method. An indirect method which was formerly very much used is the determination of the ammonia of the urine. This averages from 3 to 5 percent of the total nitrogen under normal conditions, and the amount is increased in acidosis. As the ammonia coefficient is influenced by diet, it is perhaps better to look on an increase in ammonia as suggestive of an acidosis needing confirmation by other methods. Still another method, and perhaps the simplest, is the estimation of the degree of acidosis by determining the amount of alkali (sodium bicarbonate) required to make the urine alkaline. This is known as Sellard's test. As a rule, from 5 to 10 grams of bicarbonate are required to render the urine of the adult alkaline. When acidosis exists, the amount required is greater.

In all of these methods or tests the information gathered relates only to the degree of acidosis as a whole, and does not give any information as to the acid which is at fault. In diabetes, cyclic vomiting, etc., it has been known for many years that the increase is due, in part at least, to the formation of excessive amounts of acetone, diacetic, and betahydroxybutyric acids. Howland and Marriott have reported that the acid phosphates are increased in amount in the blood of patients with chronic nephritis, which is a condition in which numerous investigators have found an acidosis present.

CONDITIONS IN WHICH ACIDOSIS EXISTS.

Under the broad concept of acidosis outlined in the first part of the review, numerous pathological conditions have been found by different investigators to show an acidosis. In acute febrile conditions, Kraus and others have found a decreased CO_2 content of the blood. This also occurs in cardiac disease, diabetes, and chronic nephritis. By Sellard's test an unusual tolerance to alkali has been found in nephritis, diabetes, rheumatic fever, Asiatic cholera, and other acute febrile conditions. Diabetic coma is the classical illustration of excessive acid accumulation, and, in part at least, this is due to the so-called "acetone bodies." We are, however, particularly interested in the acidosis of childhood, and hence this phase calls for a more extended discussion.

ACIDOSIS ASSOCIATED WITH ACETONEMIA AND ACETONURIA.

As stated above, the presence of excessive amounts of acetone bodies in the urine in diabetes has long been known, and hence the presence of these substances in excessive amounts in other diseases, as starvation, acute febrile conditions, narcosis, and cyclic vomiting, has been considered as indicative of acid intoxication in these conditions. Howland and Marriott take the attitude that the simple presence of acetone bodies in the urine is not indicative in itself of acidosis, and that acetonuria and acidosis are not synonyms. Veeder and Johnston have shown that these substances are present in the urine of normal children, and that from 60 to 70 milligrams of the combined acetone bodies are

eliminated daily. It is only when the accumulation or formation of the acetone bodies in the blood is sufficient to reduce the reserve alkali, that acidosis can be said to be present. There is no question that excessive amounts of the acetone bodies in the urine are associated with acetonemia and in turn with acidosis, and hence the problem is one of quantity rather than quality. Veeder and Johnston have shown that simple inanition for a couple of days will lead to the elimination of as large a quantity as 6 grams of acetone bodies without clinical signs of acidosis developing. Excessive acetone formation leads primarily to an acetonemia. In health from 1 to 15 milligrams per 100 c.c. are found in the blood. Howland and Marriott have found acetonemia in several cases of ileocolitis, although the acidosis of diarrhea is not necessarily accompanied by acetonemia. Another condition associated with acetonuria is the so-called "cyclic vomiting." Both acetonemia (as high as 170 milligrams per 100 c.c. of blood) and acetonuria are found in this condition, and also a definite acidosis which requires immediate alkaline therapy. Under such therapy the symptoms rapidly disappear.

ACIDOSIS WITH DIARRHEA.

It has been recognized for some years that acidosis is present in the severe diarrheas of infancy. The term was introduced in this connection by Keller in 1897, who noted a high ammonia coefficient in these cases. Czerny, about the same time, called attention to the hyperpnea and character of the respiration in nutritional disease of an acute type. Howland and Marriott have studied a large number of cases of severe diarrhea, and have confirmed the presence of an acidosis with some of the methods outlined above. They found the normal carbon dioxide tension of the alveolar air to be reduced from around 40 mm. in the normal to at times less than 20 mm. of tension. It required in some cases from 8 to 10 to 15 grams of sodium bicarbonate to render the urine alkaline in some of these cases, when, as a rule, from 2 to 3 grams are sufficient in the normal infant. In these cases, not of the ileocolitis type, it was found that there was no excessive formation of the acetone bodies, and the exact cause of the acidosis could not be determined. They consider the use of an alkali to be indicated in the treatment of such conditions, and give large quantities of sodium bicarbonate when clinical signs of acidosis, as hyperpnea, are present.

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ANTERIOR POLIOMYELITIS.

BY ARCHER O'REILLY, M. D., F. A. C. S., St. Louis.

The object of this abstract is to review the literature of anterior poliomyelitis of the last year and to bring it up to date. In 1914 Sever¹ published a most exhaustive abstract on the subject. The *Journal of the American Medical Association*, in the department of therapeutics,² reviews our present knowledge on the subject to July, 1916. Taylor³ also gives a resume of the work on this subject.

As a result of the epidemic of infantile paralysis last summer, more than usual interest has been taken in poliomyelitis, and the medical journals have been full of articles on the disease. A great deal of valuable material has appeared, and much has been written that is merely a review. In an abstract, limited as this is, of necessity, it would be impossible to review every paper, but the author has appended a bibliography of the articles that have appeared since January, 1916.

EPIDEMIOLOGY.

Fife⁴ says that infantile paralysis is not new. The first classical description of it was published by Jakob Heine in 1840, but it had evidently been observed in 1774 by Underwood and in 1816 by Jorg. Dr. J. K. Mitchell has diagnosed the resultant deformity in an Egyptian mummy. The first epidemic on record is a group of nine or eleven largely hearsay cases in a small parish in Louisiana in 1841. The first epidemic was described in 1881, since which time the disease has spread to all Europe and to North America. A few small groups of cases are followed in a few years by larger and more numerous groups, and these in turn by more extensive outbreaks and later by pandemics. In 1910 the disease was pandemic with at least 9,000 cases, and in no year since have there probably been fewer than 10,000 cases in the United States, making a much greater aggregate than the total number of cases reported from the rest of the world. Since the first outbreak the number of cases and the epidemics have increased steadily in this country until they have been reported from every section.

Flexner⁵ states that the virus of infantile paralysis is known to leave the infected human body in the secretions of the nose, throat, and intestines. It also escapes from contaminated healthy persons in the secretions of the nose and throat. The virus enters the body, as a rule, by way of the mucous membranes of the nose and throat. Here it multiplies, and later penetrates to the brain and spinal cord by ways of the lymphatics. Whether the virus ever enters the body in any other way is unknown, though under certain circumstances it may possibly enter the blood through the bites of insects, and under peculiar and extraordinary conditions it may, in monkeys, enter through the intestines; observation on human cases and on animals all tend to indicate that it enters through the upper respiratory mucous membrane. Some early experiments tended to show that blood-sucking insects might transmit the disease, but later experiments have failed to confirm them. Flexner believes that its alleged transmission by biting insects, especially the stable fly, is doubtful, as the virus has never been detected in the blood of infected persons, and later experiments with the stable fly have not confirmed the earlier ones. It does not seem probable that these insects play an important, if any, role in the

transmission of infantile paralysis. The domestic fly may become contaminated with the virus, and serve as the agent of its transportation to persons and to food. Experimentally, flies remain infective for forty-eight hours or longer. Though insects may not be active agents in disseminating the disease, they fall under the suspicion as potential mechanical carriers. Experiments have shown that the various paralytic diseases common in domestic animals are not poliomyelitis, and that they are not carriers. Studies in various countries indicate that, in extending from place to place, infantile paralysis follows the ordinary lines of travel, which confirms the evidence connecting the distributing agency intimately with human beings and their activity. The virus has been detected by inoculation tests in the mucous membrane of the nose and throat of healthy persons who have been in intimate contact with acute cases of infantile paralysis. Such contaminated persons, without falling ill themselves, may convey the infection to other persons, chiefly children.

Lavinder⁶ states that the total incidence of the disease in the population affected is usually small, and that it seems well established that the recognized cases of the disease are of far less importance in its transmission than the healthy carriers and "missed" cases. Epidemiologic studies have indicated that contact is a method of transmission, without, however, excluding the possibility of other methods. The characteristic seasonal prevalence and age incidence of the disease do not harmonize with our present conception of its method of spread. Our conception of poliomyelitis is that of a respiratory infection, spread by contact, and yet, by analogy with all other respiratory diseases, poliomyelitis should prevail not during the summer, but during the winter months, whereas it corresponds in seasonal prevalence to gastrointestinal disturbances.

Sheppard⁷ cites a considerable number of cases divided into eight groups around a common source of infection of such a nature as to point strikingly to poliomyelitis being a contact disease and contagious. He believes that epidemics should be handled as a contact infection. Murphy⁸ reports sixteen cases in which the disease was transmitted by actual contact with patients having active cases, or in the incubation stage.

The general consensus of opinion seems to be that poliomyelitis is a contact disease, and that it is transmitted to a great extent probably by healthy carriers or by mild cases that have been overlooked. Richardson,⁹ however, believes that rats play an important part in its transmission. He believes that the following facts support the theory that the disease is transferred by rodents, insects, or both: 1, summer incidence; 2, resemblance in epidemiology to yellow fever and malaria; 3, positive results of Rosenau and others with the stable fly and the successful experiments of Flexner in transmitting the disease by infected bed bugs. He states that a number of incidents have been reported, especially in Massachusetts, where poliomyelitis seemed to be particularly prevalent in places where there were rats. In Massachusetts the disease seems to follow streams where there are many water rats; rats also would be dropped along railroads from grain cars. Infection might result from desiccated rat excreta or from the rat flea, which might be an intermediary host. Infected rat fleas might also contaminate dogs and cats, or in unsanitary surroundings they might be transmitted from child to child.

Bodine¹⁰ states that a study of the previous epidemics and the present one point to a possible insect transmission of the disease, as shown in the sporadic occurrence of the disease, its biennial recurrence, and rural nature, the fact that only one or two persons in the same household contract the disease, the occurrence of most cases where the number of animals relative to the number of people is largest, and the fact that cases show a seasonal distribution to a greater degree than might be expected in contact infection. Experiments

prove that the virus can be carried externally and internally in an active state by many varieties of insects, and many insects are known to play an active part in the transmission of disease. The biennial occurrence of the disease might suggest the tick, which requires two years to mature. The possible connection of the mosquito is suggested by its presence in every locality thus far studied in the present investigation, the seasonal distribution of the disease, and the small percentage of mosquitoes infected in such diseases as malaria, thus accounting for the sporadic occurrence of the disease. The blood-sucking stable fly was found in almost every neighborhood visited in the present investigation. The reasons suggesting the stable fly as a possible transmitter were the blood-sucking habits of the adult fly, the seasonal abundance of the fly closely correlating the incidence of the disease, the geographic distribution of the fly—which is wide, or at least coextensive with poliomyelitis—its abundance under rural as well as urban conditions, the fact that flies follow horses along lines of travel, and that, in many instances, children were infected who had frequented places where the stable fly was found.

Koplik¹¹ believes that the old conception of poliomyelitis as merely a paralysis, which appeared over night with a few, if any, prodromata, has been lost sight of in the more thorough modern clinical analysis of the symptomatology of the disease. He describes the following types: 1, the abortive, probably from a scientific epidemiological standpoint the most important type of the disease; 2, the bulbospinal type; 3, the cerebral and meningeal types; 4, the bulbopontine types. All these types may be understood if we first conceive poliomyelitis to be an acute infectious disease, which involves certain parts of the general nervous structure, and there stops, or which may go on to involve, in one stroke, the whole cerebrospinal axis. It is through the abortive type, in which there is little or no paralysis, that the disease is spread to others, and its recognition is necessary in order to control its spread. The spinal or bulbospinal type is the simplest form. The paralysis usually comes on with short prodromal symptoms, the next day after an attack of vomiting, and slight fever; the paralysis, however, may come on slowly with more marked symptoms. As a rule, the paralysis in the spinal type does not spread, but it may at times progress and involve the entire trunk and even the respiratory centers. In the meningitic and cerebral types the cerebral symptoms give rise to a picture closely simulating meningitis. The bulbar or pontine type is a form which has been recognized only lately, but deserves notice as a distinct form of poliomyelitis. The fever is high, but the patient is bright, he may be restless and the knee jerks increased, but there is no marked paralysis. In the fatal cases there is an involvement of the centers that control deglutition and respiration.

Draper¹² classifies the cases as follows: 1, gastrointestinal; 2, respiratory—in these we may have the symptoms of influenza, cough, lung sign, and pains in the bones and joints; 3, febrile; 4, a type characterized by symptoms of meningismus; 5, the type in which paralysis occurs. In the first four types we may have slight transient paralysis, and in the type showing paralysis we may have as prodromal symptoms any or all of the symptoms of the other types.

Ager¹³ in his clinical work recognizes three types, the encephalitic and the myelitic, to differentiate between the muscles supplied by the cranial nerves and those supplied by the spinal nerves and the meningitic. He also mentions the fulminating fatal cases that give the most pronounced symptoms.

Robb¹⁴ mentions six main types met with: 1, the abortive type, in which the prodromal symptoms are present, which clears up quickly without any paralysis; 2, the spinal, which includes a large percentage of the cases, is characterized by the usual onset, followed by paralysis, either permanent or temporary; 3, the ascending or descending, a small group—the paralysis usually begins in

the lower limbs, or less frequently in the arms, and gradually extends, finally involving the muscles of respiration, terminating in death after a few days of illness; 4, the bulbar or pontine type, in which some of the cranial nerves are affected, frequently in conjunction with some of the spinal centers; 5, the cerebral, in which change occurs in the cortex of the brain, resulting in spastic hemiplegia or monoplegia; 6, the meningitic type, in which the symptoms closely resemble those of cerebrospinal fever, the pia mater being involved.

Infantile paralysis is essentially a disease of childhood, and is more prevalent under 5 years of age. Flexner⁵ says that not all children and relatively a few adults are susceptible. Young children are more susceptible, generally speaking, than older ones, but no age can be said to be absolutely insusceptible. When several children exist in the same family, one or more may be affected, while the others escape or seem to escape, but the more closely these groups are studied, the more numerous, it appears, are the cases among them; this means that the term infantile paralysis is a misnomer, as there are many cases without paralysis, or in which the paralysis is so slight as to be overlooked.

Emerson,¹⁵ from statistics of the health department, believes that at least 99 percent of the children affected in the 1916 epidemic in New York have been born since the last epidemic. Out of 1,584 cases in Manhattan and Brooklyn, 82 percent were under 5 years of age and 97 percent were under 10 years.

Weisenburg,¹⁶ in a study of the epidemic in Philadelphia, says that there was an unusual number of adults in whom the paralysis was much more marked and the recovery much slower than in children. Not many colored children had the disease, and, in those affected, recovery of power was much slower than in white children. There was only one case in which a second attack occurred, thirteen years after the first.

Taylor¹⁷ reports a convincing case in which there was a recurrence of poliomyelitis three years after the first attack. He also reviews the cases in with a relapse was reported. In one series the so-called recurrence occurred in no case later than four months after the first attack. In such cases it is difficult to say that the attack may not have been an exacerbation or a relapse. Other cases in which a longer interval supervened between attacks are reported by Sheppard, 16 years; Esharer, 11 years (doubtful case); Echert, 6 years; Lucas and Osgood, 2 years 3 months; Oulmont and Bondouin, 1 year (doubtful case); Sanz, 14 years.

McLaughlin¹⁸ states that 1/10 of 1 percent often represents the attack rate in an outbreak. In a mass of contradictory and irregular manifestations, only the seasonal prevalence, reaching its maximum in August and September, and the age incidence are constant. The great majority of the cases are children under 5, a smaller group from 5 to 10, a few from 10 to 20, and only rarely over 20. Its prevalence seems to be greater in rural districts than in cities. From a study of statistics he thinks the limit of susceptible age groups may be higher in rural and suburban life than in cities, possibly due to the fact that there is a constant immunizing influence at work in the urban communities.

Fronczak¹⁹ reports some observation on the distribution of poliomyelitis in the 1912 epidemic in Buffalo. The incidence of cases in relation to population varied widely in different wards and varied widely in relation to density. Of the five most densely populated wards, only one showed a proportion of cases above the average, while two of the least populous wards showed a slight excess above the average. When the ten wards were grouped into two groups according to density, it was found that in that group where the proportion of cases was the lowest the average density was twice as great.

It was also found that the disease started in the Italian section, which was the most congested and one of the most unclean sections.

DIAGNOSIS.

The early and prompt diagnosis of poliomyelitis is most essential in the proper treatment of the disease and in the prevention of its spread. Koplik¹³ says that during an epidemic the question of diagnosis must center about the discovery of the early symptoms or prodromata. Experimentally the incubation period has been shown to be from eight to nine days, or even as long as thirty days. There is a prodromal period of from one to seven days. Vomiting and fever, which is continuous, remitting slightly with headache, malaise, irritability with a tendency to sopor, during an epidemic, should make us suspect poliomyelitis. We should be especially careful if, in addition to these, there are shooting pains in the extremities, with hyperesthesia, rigidity, Macewan and Brudzinski reflex. The weakness of the limbs and the increase or diminution of reflex are valuable. Lumbar puncture should be made, which usually shows a lymphocytic cytology and an increase in globulin.

Neustaedter²⁰ believes that our hindrance is the difficulty of early diagnosis. Fever is the first sign, sometimes vomiting and diarrhea, always nasopharyngeal symptoms, frequent attacks of sneezing, with copious nasal discharge; nasal mucous membrane edemic, glistening and anemic, with a serous, frothy transudate. This condition persists for a few weeks after the paralysis has set in; the mucosa becomes anemic and atrophic; this in the author's opinion is an important sign. Headache and pain are usually present.

Wilson²¹ reviews the symptoms of 400 cases. Fever was the most constant initial symptom (334 cases). Vomiting was noted as an initial symptom in 67 cases, and as an early symptom in 132 cases, sometimes after the child had retired, more often after eating. Persistent constipation was more common than diarrhea. Abdominal pain, sore throat (follicular tonsillitis), injected fauces, enlarged tonsils, exudate, mucopurulent frothy discharge, epistaxis, coryza, conjunctivitis and cough were some of the other symptoms noticed in a few of the cases. The most common nervous symptom was an early and persistent drowsiness. Irritability was the next most common, associated with marked hyperesthesia. Tenderness and stiffness of the neck was a common symptom. Tremor was a frequent symptom, sometimes limited to a single group of muscles, usually of the extremities. Twitching was noted; sometimes choreiform—it often preceded facial paralysis; headache and convulsions were also noted.

Louria²² says that we must think of the disease as an acute systemic infection, involving in the main the cerebrospinal axis. Since degeneration of the nerve tissue is secondary to the acute inflammatory condition, the stage of paralysis is preceded by a generalized irritation of the cerebrospinal system. The preparalytic stage manifests itself by such symptoms as headache, somnolence, irritability, hyperesthesia, general tenderness, rigidity of the neck, Kernig's sign, Macewan's sign, altered reflexes, and mild muscular weakness. The fever is moderately high, remittent in type, sudden in onset, without rigor. The pulse is rapid, out of proportion to the temperature; respirations increased, but not irregular. Gastrointestinal symptoms are marked, vomiting frequently persistent and bearing no relation to food. Pharyngitis, tonsillitis, and bronchitis commonly occur. A paralytic condition of the intercostal muscles may be present, which prevents the child from expelling the mucus accumulating in the bronchi. The child was drowning in its own secretions, and this has been interpreted as pulmonary edema. The most significant symptoms of the onset are those referable to the cerebrospinal axis. Somnolence is a most important symptom. The posture of the child is one of

hypotonicity. Absence of patellar reflex with diminution of the achilles reflex is an early and almost pathognomonic sign.

Fischer²³ says the early stage of poliomyelitis is characterized by a sudden onset, with high temperature, lasting several hours or days; headache, pain in the back and limbs, and sometimes rigidity of the trunk and neck. The patellar and plantar reflexes may be exaggerated, diminished, or even absent. Lumbar puncture gives a colorless spinal fluid, devoid of pathogenic bacteria. There is an increase in the leucocytes, especially the polynuclear percentages in the early stages, later a mononuclear increase. The globulin reaction in the beginning is negative, later it is positive. Flexion of the spine anteriorly produces pain and stiffness of the neck.

Fraser²⁴ gives the preparalytic symptoms as fever of sudden onset, drowsiness, general weakness, loss of appetite, vomiting, irritability when aroused, caused by diffuse muscle pain and tenderness, mild opisthotonos may be present, and general muscular weakness. Spinal fluid shows globulin increase and cell count. Blood is normal. Lumbar puncture in obscure cases will differentiate cerebrospinal meningitis, but photophobia, rash, and organisms in the spinal fluid should make the diagnosis clear.

Robb gives the four most dependable signs as drowsiness, pain and tenderness, stiffness of the neck, and profuse sweating.

There is a general agreement as to the symptoms in poliomyelitis, and all the writers agree that a lumbar puncture should be made early, as it is of the greatest importance in confirming the diagnosis. Neal²⁵ in writing of the laboratory aids in diagnosis, says that Peabody, Draper, and Doches of the Rockefeller Institute have demonstrated that the blood picture shows a varying increase in leucocytes and a polymorphonucleosis. She says, however, that this is found in so many cases that it is of little aid in the diagnosis. The most reliable and valuable aid is the study of the spinal fluid. In the early stages of poliomyelitis the spinal fluid is clear, or, rarely, it may be slightly cloudy. It often shows a good fibrin web formation. There is a slight to moderate increase in albumin and globulin, and also of the cellular elements. The reduction of Fehling's is prompt. In the cloudy fluids there is polymorphonucleosis, which runs about 60 percent and may run higher. In examining such fluids she has frequently found large mononuclear cells, which she believes to be in a measure characteristic of poliomyelitis. Fluids from the cerebral and encephalitic types of poliomyelitis sometimes may be differentiated from fluids of tuberculous meningitis only by animal inoculation.

DuBois²⁶ believes that at the present time the examination of the blood is of little practical value, and that the examination of the urine is of no diagnostic importance as far as is known. The examination of the spinal fluid is most important. Microscopically there is an increase of cells—marked, moderate, or slight; these may be mostly polynuclears or mostly mononuclears, more often the latter. There is a large number of epithelioid cells that seem to be more numerous and more frequently found in poliomyelitis than in other conditions. The chemical findings on which most reliance is to be placed are the prompt reduction of Fehling's solution, a well-marked ring with nitric acid and a positive reaction with Noguchi's test. After two or three weeks, as a rule, the examination of the spinal fluid is of less consequence; the changes are so slight that nothing definite can be said about it. The increase in globulin and albumin usually persists longer than the increase in cells.

ETIOLOGY.

The work of Flexner and his associates,^{27 28 29 30 31 32} in demonstrating the nature of the virus, and later the organism, has stimulated research along this line, and in the last year, and especially in the last half of the year,

several important contributions have appeared on the subject, and have materially advanced our knowledge of poliomyelitis.

Flexner,⁵ in an article this year, says that poliomyelitis is caused by the invasion of the central nervous system of a minute, filtrable organism which has now been secured in artificial culture, and as such is distinctly visible under the higher powers of the microscope.

Mathers³³ took small pieces of tissue, which, when thoroughly washed, were macerated in normal saline solution, and the emulsion thus obtained inoculated into various media, both aerobically and anaerobically. In seven of eight cases examined growth developed in the aerobic ascites-dextrose broth and on agar cultures after eighteen hours, while in the anaerobic cultures a definite growth usually did not appear until after from three to seven days, and then often very scantily. In six of the seven instances a pure culture of a gram positive micrococcus was obtained; in one the cultures also gave a gram negative bacillus. The coccus grows rapidly in aerobic ascites-dextrose broth as a granular material along the side of the tube, gradually settling to the bottom as a white flocculent sediment. In the anaerobic cultures, after from three to seven days, there is a very small amount of sediment and some turbidity in the medium around the tissue. Morphologically the organism varies with the medium upon which it is grown. In ascites-dextrose broth it is gram positive, arranged in pairs and short chains. In anaerobic culture it is variable in size, usually very small, gram-positive, arranged in pairs, clumps, and chains, with an occasional large form among the minute bodies.

On blood-agar plates it grows in small dry colonies, which produce a faint green halo and a slight degree of hemolysis. The cultures were obtained from the brain and cord, but have not been obtained from the heart blood or from the spinal fluid as yet. The organism has been obtained from the mesenteric lymph nodes. Intracerebral injection of the organism soon after isolation has produced paralysis in monkeys. The paper is a preliminary report, and the author says that, in view of the accepted facts in regard to the virus of epidemic poliomyelitis, it would seem most reasonable to regard the micrococcus described as a secondary invader, but further work is necessary before its significance can be fully understood.

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streptococcic forms, which investigators have considered contaminations, may be the identical organism grown larger under suitable conditions.

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the disease. They believe that these results indicate that specific opsonins for the poliomyelitis coccus found in the brains and cords of patients dead of acute poliomyelitis develops during the course of the attack. This opsonin usually appears in the blood during the second week of the disease. That it is specific seems likely, since no change was observed in the opsonin for streptococcus pyogenes or streptococcus viridans. These results strongly suggest that the poliomyelitis coccus is of importance in the causation of the disease.

Rosenow, Towne and Wheeler³⁸ report some experiments on monkeys which tend to show that immunity was conferred on three monkeys by inoculations which were not followed by obvious evidence of infection.

Rosenau and Havens³⁹ reported earlier in the year that they had been able to pass the virus of poliomyelitis through eight generations of rabbits. The virus did not get more pathogenic, and was variable in its effects.

Taft⁴⁰ experimented on two series of monkeys, thirty-eight in all—one series injected subdurally with virus from spinal cords of monkeys, the other series injected with virus from various sources. Similar results were obtained in all cases. Those of short incubation and brief duration before death showed a corresponding abundance of polymorphonuclear cells in the pericellular infiltrate and extreme degeneration of anterior horn cells. Those in which death was delayed weeks or months showed a persistence of small round cell infiltration, but no polymorphonuclear leucocytes, even in cases with extreme nerve cell destruction.

Bryant⁴¹ states that during the late epidemic of poliomyelitis there were a great many cases of pharyngitis, and that their number fluctuated with the number of cases of poliomyelitis; some of them showed definite symptoms of the disease, while others cleared up. He believes most of them were suffering from different degrees of poliomyelitis. The number of cases also seemed to fluctuate with the number of cases of poliomyelitis. He thinks this type is a very important one and seems to have been generally overlooked.

PROGNOSIS.

Stern⁴² reaches the following conclusions on the prognosis of poliomyelitis. The death rate of epidemic infantile paralysis is as high as any of the most serious diseases of childhood—from 9 to 20 per cent. in various epidemics. While a few perfect complete cures are authentically reported, the vast majority of patients make only a partial recovery of muscle power, with a more or less imperfect functional result. Spontaneous cure unassisted by treatment is at its maximum in from three to six months. Careful treatment, physiologic rest, graded massage, stimulating electric applications, resistance exercises, muscle training, etc., improve greatly the changes for partial recovery and lengthens indefinitely the period in which such recovery can take place. Misuse, overwork, overstimulation, overexertion, contractures, and deformities are particularly harmful, and detract from the power of recovery and often destroy what little power has been gained. The prognosis should always be guarded, conservative, and truthful, lest the patients, expecting too much, should in their disappointment throw away all rightful gain in strength, power, and function while seeking the chimera of a perfect cure. With proper treatment, followed by braces, orthopedic operations, and the life, almost every patient with infantile paralysis should, so to speak, be put on his feet, and acquire independent and useful function of the afflicted member.

Flexner⁵ states that from 5 to 20 percent die during the acute stage of the disease. The average death rate in epidemics has been below 10 percent. Of those who survive a part make complete recoveries. This number is greater than is usually supposed, because it includes not only the relative large number of slight or abortive cases, but also a considerable number in which more or

less paralysis was present at one time. The disappearance of the paralysis may be rapid or gradual, may be complete in a few days, or may require several weeks or months. The remainder, not a small number, suffer some degree of permanent crippling. Even in this class the recovery may be great, and the residue may be so slight as not to seriously hamper the individual, and the more severe may be greatly helped by orthopedic treatment. Above all, it must be borne in mind that the improvement may be very slow and may extend over years.

La Fetra⁴³ believes that one should be exceedingly cautious about giving a good prognosis, as to life, before the fourth or fifth day. No matter how slight the initial paralysis may seem, there is always the danger that the disease will extend to other and more important nuclei. The disease is one of the most serious with which pediatricists have to cope, and in the present state of our knowledge of its prevention and treatment we should be very cautious about giving any prognosis during the first two days.

TREATMENT.

Netter⁴⁴ was the first to treat an acute case of poliomyelitis by injection of serum obtained from a person recovered from the disease. He reported this work in 1914;⁴⁵ in January he reported the results of this treatment on thirty-two cases, and in a later paper he has reported the cure of two more cases.⁴⁶ The serum of individuals who have had poliomyelitis retains its potency for more than thirty years. As far as possible, however, serum is used from persons who have had the disease within five years. The serum is withdrawn aseptically and sterilized by fractional sterilization. The donor must be healthy and must have had a Wassermann test. Five to fifteen c.c. are injected into the spinal cord and should be repeated on the average for eight consecutive days. A reaction may develop, which is usually shown by some change in the cellular composition of the spinal fluid, but there may be some fever and pain. A reaction does not contraindicate the use of the serum. He says that serotherapy can arrest the progress of the paralysis, and can effect the disappearance of the paralysis already developed, provided it is applied early. Practiced in the preparalytic stage, it may prevent the appearance of the paralysis.

Batten⁴⁷ lays stress on rest, which should be absolute for at least three weeks.

Koplik⁴¹ believes that in the mild cases of the abortive type the patient should be isolated, kept perfectly quiet, and watched. A lumbar puncture is a benefit to the patient. In the cerebral cases it lessens restlessness. It reduces the amount of intracranial pressure and removes a certain amount of toxin-laden fluid. The children should be absolutely quiet; not only should the room be quiet as to noises, but the body should have absolute rest. It has been suggested that, where possible, the early cases should be put on a Bradford frame to secure rest for the cerebrospinal axis. In the paralyzed cases, if there is a tendency to pain or deformity, this may be relieved if the limbs are put up in plaster or glass. If there is much pain in the extremities, it may be relieved by warm baths. It is wise, however, to give only one bath in twenty-four hours, and in doing so the patient must be lifted very carefully in and out of the bath. We must remember that anything which tends to produce too much motion in the coverings or parts of the brain or spinal cord not only aggravates the symptoms, but may do irreparable mischief. He cannot say that there is any positive evidence of the utility of urotropin in checking the disease. It should be given, however, with the feeling that it may do some good. Aspirin and salol may be used for the pains, or, very cautiously, very small doses of pyramidon. Opium is given only where the bromides do not relieve the restlessness, and not where there is a tendency to sopor. Iodide of

potassium relieves the neuritic pains much more successfully than any drug thus far mentioned. After the acute stage has passed, and there is weakness and paralysis of the extremities, the patient should be given the benefit of the Charcot injections of strychnine. A child of 5 should be given one injection of 1/40 to 1/50 grain once a day in the group of weakened and paralyzed muscles, selecting a different set of muscles each day.

Bass⁴⁸ emphasizes the necessity of absolute rest in a quiet, darkened room. Pain and hyperesthesia may be relieved by drugs—bromides, codeine, and morphine—in appropriate doses; aspirin is also useful. Local applications of heat in the form of cotton wool and hot water bags should be tried. He does not believe in the use of hot baths, as they necessitate too much motion of the patient. During the febrile stage the child should have a diet of fluids and semisolids; when this stage is passed he may have solid food. If the muscles of deglutition are involved, and in severely toxic forms, gavage may be necessary, but only for a short time. Where the respiratory center is involved, life may be prolonged by artificial respiration, insufflation apparatus, or by galvanization of the phrenic nerve. Deformities should be prevented by suitable supports. Hexamethylenamine may be given during the first week in relatively large doses.

Roby,⁴⁹ on the supposition that normal adult blood might contain immune bodies, treated two cases by intramuscular injections of citrated whole blood. Both cases showed improvement, but he is not sure that the improvement might not have taken place in the ordinary course of the disease. A little blood from a convalescent patient was used also, but here again no definite conclusion could be drawn.

Sophian⁵⁰ divides the treatment of infantile paralysis into (a) relief of hydrocephalus; where pressure symptoms are present with stupor, twitchings, convulsions, and respiratory embarrassment, one or more lumbar punctures usually give permanent relief. (b) Intraspinous injection of serum, normal human, normal horse, or convalescent. In order to be most helpful, the serum should be injected early in the disease. In his cases the convalescent serum, used in a small series of cases, did not seem to give any better results than the normal horse serum. Best results were obtained in early cases. Some of the late cases treated showed more improvement than is generally seen in untreated cases. No observations were made with normal human serum. Three cases treated with intraspinal injections of epinephrine, as suggested by Meltzer, showed no results. (c) In the treatment of respiratory paralysis, Meltzer's pharyngeal respiratory apparatus and the administration of oxygen under pressure were used without any marked results, but he believes that it should be given a careful trial. (d) In the general treatment the main points which he emphasizes are the care as to feeding and the bowels and bladder. Respiratory embarrassment should be carefully watched for. Turning from side to side is important, as it might possibly have some influence on the paralysis, owing to shifting edema. (e) Orthopedic treatment should be begun as early as possible.

Flexner⁵¹ reviews the previous experimental work on the use of convalescent serum, and believes that it has shown some power in preventing or lessening the effects of the disease. He then summarizes the work of Netter, and believes that the use of convalescent serum may be of benefit in the treatment of acute poliomyelitis.

Meltzer⁵² reviews the pathology of poliomyelitis, and believes that the damaging effects can be assumed to result in part from the direct pressure on the nerve cells of hemorrhages, edema, and exudate, which extend beyond the site of inflammation in poliomyelitis. He has shown in experimental inflammation that the injection of adrenalin would markedly reduce this periinflammation.

matory edema. On these observed facts he bases his theory that patients with acute poliomyelitis should be given intraspinal injections of adrenalin. His theory is that adrenalin lessens the edema, thus preventing injury from pressure. He also believes that adrenalin may have some specific effect on the virus. He reports a number of experiments and cases to show the beneficial effects of adrenalin. As soon as the diagnosis is made he injects 2 c.c. of 1 in 1,000 every four to six hours. He also recommends his insufflator in ascending paralysis, as it would prolong or even save the life in some cases. Where there is difficulty in respiration he advises the administration of oxygen under pressure in respiratory rhythm.

Duncan⁵³ suggests the autotherapeutic method of treatment in poliomyelitis. He reports one case in which ten c.c. of spinal fluid was withdrawn and two doses of 1 c.c. and 0.5 c.c. were injected hypodermically. There was some improvement, which the author believes was the result of the serum. Since then the author has tried it on twelve cases and thinks that it has some effect.

Sheffield⁵⁴ reports on thirty-three cases, and believes that the therapeutic measures employed compare favorably with all other methods, including the injection of serum and adrenalin. The treatment consists in cupping (six to ten cups on each side of the spinal column); hot mustard baths every four to six hours; sodium or ammonium salicylate and strychnine internally; occasional lumbar puncture, especially where twitching or rigidity is pronounced; and camphorated oil, hypodermically, whenever respiratory difficulty presents itself. Immobilization of the paralyzed limbs and light massage and passive motion are resorted to immediately, irrespective of acuteness of symptoms.

Lewis⁵⁵ reports the results of treatment of seventy-seven cases by the injection of epinephrine chloride as advised by Maltzer. The results seemed to indicate that the treatment was of distinct value.

Rueck⁵⁶ reports four cases treated by injections of citrated normal human adult blood. He believes that adult blood contains certain antibodies. Three of the cases made satisfactory recoveries. The author thinks that the treatment is of value.

Wynkoop⁵⁷ describes twenty-four cases. He believes that spinal puncture is of distinct value in 80 percent of cases, but is of no value after paralysis has developed. He is opposed to the use of urotropine in large doses, as he thinks it does no good and may do harm to the kidneys.

Robinson⁵⁸ thinks that the simplest and probably the most effective treatment in the beginning of the disease is the internal administration of ammonium salicylate, supplemented by the local use of carbolated petrolatum introduced into the nares night and morning. He thinks that immunized blood serum has been of great help, but it is difficult to get and must be administered by an expert; where possible, the two methods might be used together.

Wells⁵⁹ reports the results of the treatment of poliomyelitis with immune human serum in fifteen cases. There were ten donors; two of these had recovered from poliomyelitis over thirty years before; their serum did not seem as active as that from more recent cases. Three methods of administration were used intraspinally, intravenously, and intramuscularly, and in combination. The author thinks that the best method is a combination of intravenous and intraspinal. Because the lesions are not confined to the nervous system, and because the lesions therein consist essentially in perivascular infiltration, intravenous injection of serum appears to be a rational procedure, either alone or in combination with intraspinal injection. Intravenous injections of serum should consist of doses from 50 to 1,000 or more daily. Following intravenous or intramuscular injections of serum, spinal fluid should be withdrawn. Intraspinal injection of serum usually produces an increase in the number of leucocytes, with increase in the proportion of the polymorphonuclear

cells in the spinal fluid. No ill effects followed the use of serum in this series. In all cases after intravenous injection, and to a less degree after intraspinal injection, a noticeable improvement usually occurred, which in some cases was only transient. Early administration of the serum is urged; in severe cases late administration of the serum has produced little, if any, noticeable influence on the course.

Schwarz⁶⁰ used convalescent blood serum on twenty-one cases and treated twenty-one others expectantly. He was of the opinion that too much was not to be expected of the serum, though possibly the number of cases he had observed were not sufficient to warrant any very definite statement.

Zingher⁶¹ said that convalescent serum seemed to increase the irritation and to increase the number of the white cells. This was the immediate effect. In animals the serum produced a distinct polynuclear leukocytosis, and, so far as they had observed, was not specific. He believed, however, that the serum was indicated in the early stages of the disease.

Wright⁶² urges the necessity of complete rest in the early stages of the poliomyelitis, and suggests the use of plaster of paris for the limbs and body.

Weisenburg¹⁶ recommends lumbar puncture as giving the best results, performed early and repeated. He says that none of the chemical forms of treatment have been of value, nor has he observed benefit from the use of the serum treatment.

AFTER-TREATMENT.

The orthopedic literature this year has contained a good deal on the treatment of poliomyelitis, but on the whole there is very little that is new.

Gallie⁶³ describes an operation for tendon fixation, in which he exposes and isolates the tendon, draws it taut to correct deformity, and buries it in the bone in such a way that, when healing takes place, the deformity can not recur. The tendon becomes firmly attached to the bone and thus offers a firm support.

Ryerson⁶⁴ thinks that, wherever possible, operative procedure should be indulged in to eliminate the use of braces. He says that no radical operation should be performed for at least two years after the onset of the paralysis. During this time an attempt should be made to favor the return of function to the paralyzed muscles. Deformity should be prevented by apparatus. Effort should be made to compel the patient to use the weakened muscles. Very young children should not be operated upon unless it is impossible to control the deformity by apparatus. The author then reviews the various operative methods which may be used.

Mayer⁶⁵ gives a very complete description of the various principles which should be observed in tendon transplantation, and fully describes the anatomy and physiology of the tendon.

Lovett and Martin,⁶⁶ from their study of the cases in the Vermont epidemic, found that the ratio of partial to total paralysis was as 9:1. In order to study properly these partially paralyzed muscles, it was necessary to have some instrument of precision to test the strength and to record it. To meet this requirement the spring muscle test was devised, which consists in estimating the strength of various muscle groups by means of a spring balance. Standardized positions are assumed for each group. The test is based on the patient's power to hold a position against the pull of the balance. The muscles to be tested are arranged in twenty-two groups on each side of the body. The muscle test is a valuable guide in following the effects of treatment. In this way it was found that the chance of improvement in affected but not totally paralyzed muscles under expert treatment by muscle training was about 6:1; under supervised home exercises, 3.5:1; under home exercises with-

out supervision, 2.8:1. Untreated muscles showed an improvement ratio of 1.9:1. Of forty-four totally paralyzed muscles at the end of one year, 48 percent developed demonstrable power after two months of treatment. Of forty-four totally paralyzed muscles at the end of one year not receiving treatment, 27 percent showed demonstrable power at the end of two months, which shows that spontaneous improvement has by no means stopped at the end of a year. It was also shown that fatigue causes a loss in muscle power—often permanent.

Bartow⁶⁷ recommends a further extension of the use of his intraarticular silk ligaments to stabilize flail hip joint in genu-recurvatum and to prevent outward rotation of the thigh. In this method tunnels are made through the bone and heavy paraffined silk is passed through these and through the joint; the ends are then fastened, holding the limb in the desired position.

Legg and Ober⁶⁸ review 100 cases of tendon transplantation. They do not present anything new, but lay especial stress on studying each case with the idea of using those methods and muscles which will give the best functional results.

Willard⁶⁹ states that the lateral deviation of the foot, which is such a difficult deformity to correct and hold, takes place not in the ankle joint, but in subastragular articulations. To prevent this deformity, he recommends arthrodesis of the astragaloscaphoid joint; this also includes the astragalocalcaneal articulations, and, in bad cases of varus, perhaps the calcaneocuboid joint. The astragulus, the scaphoid, and the calcaneus become one solid bony mass, movable in the anteroposterior directions, but immobile for side movements. No shortening of the foot occurs; a rigid point of attachment is given for the paralyzed muscles. It does not interfere with the use of further operative measures on the foot, if these become necessary.

Rogers,⁷⁰ from a study of 130 cases operated at the Massachusetts General Hospital, concludes that it is advisable to do as little operating on children as possible unless deformity develops. The various methods are useful if properly selected to the needs of the individual case. In adults good results have been obtained by tendon transplantation alone or combined with bone resection. The Forbes operation is of definite value. Astragalectomy has given better results than arthrodesis of the ankle joint in those cases which present very marked deformity.

Ryerson⁷¹ reviews some of the methods of stabilizing the flail foot. He does not think that the use of silk ligaments has been entirely satisfactory, nor has the bone graft or peg. He thinks that Gallie's method is most satisfactory where there is not much deformity. The author, in addition to putting the tendon in a groove gouged in the bone, drills a hole at the upper end of the groove. The proximal end of the tendon, which has been dissected up as far as possible, is cut off and passed through this hole and then sutured to the portion in the groove; this gives a much more firm attachment. Where there is considerable deformity, it should be overcome by an astragalectomy followed by the above method of tendon fixation. Astragalectomy, as described by Whitman, is a valuable operation. If, however, there is any appreciable power in the tendo Achilles, the tibia should not be displaced forward upon the foot.

Davis⁷² says that stability of the foot alone is not difficult to obtain, and can be secured by arthrodesis, fixation of tendons, transplantations of tendons, and silk ligaments. In the knee, hyperextension is most desirable in securing stability; he does not believe that this will become excessive owing to the contracture of the ligaments. In hip paralysis the problem is more difficult, and in severe cases arthrodesis may be advisable. Extreme external rota-

tion can be controlled by sewing the fascia lata firmly to the posterior edge of the greater trochanter while the foot is held in internal rotation.

Taylor⁷³ discusses the various operative methods and their proper use. He thinks that tendon shortening has been tried and found wanting. Tendon lengthening is no better than tenotomy. Arthrodesis is useful only in flail ankle joints in adults. Articular transposition for calcaneus, as described by Davis, is useful, but does not add any power unless a tendon transplantation is done. Astragalectomy is too mutilating, and is not justified unless other measures fail to give as stable results in correction and better function. The removal of small bones in children is not advisable, as it may interfere with development. Nerve anastomosis and neurotization have not as yet shown anything practical. Tendon transplantation gives the best results if scientifically studied.

Wallace⁷⁴ gives a statistical review of the operations for deformities and disabilities following poliomyelitis at the Hospital for Ruptured and Crippled. He reaches the following conclusions: Nearly one-third of the operations would have been unnecessary if the patients had received proper brace attention. The Souter operation for contractures about the hips have been most beneficial. The transplantation of an active hamstring tendon, when both were normal, to the attachment of the paralyzed quadriceps extensor tendon has so improved the power about the knee that braces have been discarded. Arthrodesis operations for paralytic deformities in children have been of little value. The grooving of the tibialis anticus tendon into the anterior surface of the tibia and transplanting the extensor propius hallucis tendon to the calcaneoscapoid ligament, for equinovalgus deformity, has been helpful. The most satisfactory operation for calcaneovalgus and danglefoot deformity has been the typical Whitman operation. When successful, a firm basis for standing and walking has been secured, and after a few months of supervision the patients have been able to walk without artificial aid, thus probably stimulating the growth of the paralyzed extremity.

Lovett and Martin⁷⁵ in this paper give a technical description of the spring balance muscle test, which has already been described,⁶⁴ the power of the muscles which govern the movement of the limbs. The value of the test consists in the possibility of duplicating exactly the conditions of the first test at succeeding ones, so that a definite idea of gain or loss in muscular strength can be registered in pounds.

Sharpe⁷⁶ reports three cases in which he did an intradural nerve anastomosis for the paralysis of poliomyelitis. He believes it is similar to nerve suturing in brachial plexus palsy, but has the advantage that in intradural root anastomosis there is not the preexisting scar tissue, which tends to hinder nerve regeneration. The operation is not more difficult than laminectomy. Beyond rigid asepsis and a carefully worked-out technic, the greatest requirement is patience and a knowledge of the anatomy of the cauda equina and the arrangement of the nerve roots. He unfortunately does not give the results of his operation.

Lovett⁷⁷ in this paper reviews pretty generally our present knowledge on the treatment of poliomyelitis. The first stage runs from the onset to the time when tenderness has disappeared. During this stage massage and electricity tend only to irritate the diseased nerve roots. Rest is the physiologic requirement. Hexamethylenamine may tend to lessen the risk of infection, but does not affect the paralysis. During this period deformities should be prevented and beginning scoliosis should be looked for. Toward the end of the first stage hot saline baths are desirable, and permit some exercise to the affected limbs. The second stage, or phase of convalescence, lasts from the end of the first stage for about two years or more, at the end of which time

the disease has become more or less stationary. The problem is to restore maximum function to the affected muscles. In this stage the patient should be got on his feet as soon as possible. Sitting tends to cause flexion deformities, while the effort to balance when standing gives exercise to the muscles not otherwise reached. Fatigue must be avoided. If patient can walk without braces, so much the better. If braces are necessary for ambulatory treatment, they should be used, but then only in walking and not continuously, and should be used if deformity ensues when standing or walking. If the abdominal muscles are weak, or there is a tendency to scoliosis, a corset or jacket should be worn from the end of the first stage. Massage is of value, because it retards atrophy and promotes muscle tone; it does not, however, promote the passage of nerve impulses. It should not be given roughly or for too long a period. Electricity does not seem of value. Heat is useful, either as radiant heat or from an oven. It increases the flow and favors muscle contraction. Muscle training is of the greatest value in this stage, and this stage is important because, no matter how operative the surgeon may be, he will during these two years use nonoperative treatment. Muscle training attempts to drive an impulse from brain to muscle to enable it, if possible, to open up new paths around the affected centers in the cord. The connection between the nerve centers is most complex, and there are more partially paralyzed than completely paralyzed muscles. Deformities must be prevented by avoiding malpositions. If deformities exist, they must be corrected before treatment is begun. Stretched muscles are at a great disadvantage as far as recovery goes. Overfatigue from massage or exercise is very serious, and may result in permanent loss of power. The third stage is the stationary stage. The requirements as to the muscles still exist, but are not as urgent. In untreated cases, muscle training may yet accomplish much. The dominant requirement in this stage is operation, primarily to improve function and secure stability. Of these, tendon transplantation is the most brilliant, and the simpler methods have replaced the more complex. Nerve transplantation has not been very successful. Arthrodesis has lost favor, and is not advisable until late adolescence. The Whitman operation of astragalectomy is very useful, and is used in many deformities of the foot. The Davis operation of transverse section of the foot is also useful in calcaneus deformity. The use of silk ligaments is brilliant when successful, but it has often failed, probably because too little silk has been used. Tendon fixation, as revived by Gallie, is extensively used, and seems to have a field of usefulness.

Wallace⁷⁸ states that the treatment of poliomyelitis and the conditions arising from it may yield most gratifying results when properly and thoroughly carried out. He reviews the treatment, which he summarizes as follows: Every effort should be exerted to prevent the disease by strict quarantine. Many hard hit cases can be saved from multiple paralyses by prolonged rest, competent medical treatment, and careful nursing. Vicious deformities may be avoided by early and thorough orthopedic care. Operations give the most salutary results when the cases are carefully selected and the proper one performed.

Thomas⁷⁹ says much permanent damage can be prevented by proper treatment. "Prevent fatigue" is the advice he would give to all physicians and patients, not only from active movements, but also from passive movements and massage and electricity. Sometimes children discharged from the hospital may have only a slight muscle weakness, which does not become apparent until after the muscles have become fatigued. Permanent lameness may be prevented if fatigue is never allowed. In the severe types there are many muscles which are weak and which are overlooked on account of the more prominent paralysis. Deformities should be prevented. Weak and paralyzed muscles

are sick muscles, with deranged nerve and blood supply, and should be treated as such. Sick muscles tire easily, not only by active use, but also by passive use and by massage, and their usefulness is also harmed. Study the result, following the treatment. Undertreat rather than overtreat. Avoid fatigue.

H. C. Frauenthal⁸⁰ states that during the period of convalescence active treatment should be begun. A brace should be used to prevent deformity, but should be removed every day to allow the normal functions of the limb. The child should be encouraged to indulge in the mental effort, even though there is no muscular response in the paralyzed limb. These patients tend to show an improvement for a given time, but, sooner or later, improvement comes to a standstill. This is the time for renewed effort or surgical intervention. Heat and massage are of value, but the author, in spite of the writings of others, thinks that electricity is the most valuable form of treatment. He describes fully the use of the galvanic current. Other currents are used sometimes to better advantage when they are indicated. He has found the d'Arsonval of great value when used with a series spark gap in producing contraction where none of the other modalities would act. Before electricity is given, the limb should be thoroughly heated and massaged, and after being treated the patient goes through a course of voluntary therapeutic exercises. This educational exercise, undoubtedly, has more therapeutical value than other methods of treatment, with the exception of electricity. He also uses electricity for the chronic stage.

Ashley⁸¹ believes in absolute rest in the acute stage; the parts should be supported and stretching by bed clothes, and faulty position should be prevented, nor should any irritating treatment be indulged in. In the convalescent stage, if the patient assumes a position of deformity when standing, it should be corrected by braces. Massage in this stage is most useful. It should be given twice a day, for not more than five minutes at a time. Heat is also very valuable, and should be administered as hot baths, hot dry packs, woolen clothes, etc. Electricity, he believes, is useful only in determining the amount of degeneration and as a placebo. It is fraught with danger, and, if used excessively, may result in permanent loss of power. Muscle training should be in skilled hands. Operations should not be undertaken under two years.

Davis⁸² divides paralytic period into two periods—the stage of improvement and the stage after improvement has ceased. During the first period radical operations should be avoided, and treatment should consist in the use of training and apparatus. In the second period, operative treatment should be used, to do away with the use of apparatus. Up to the present time most of the work has been done on the lower extremity. The author does not believe that tendon transplantation is always as successful as might be desired. He recommends arthrodesis of the subastragaloid joint to prevent varus and valgus deformities, with appropriate tendon transplantations where necessary. In cases of calcaneocavus the author prefers his operation of horizontal transverse section. With a flat gouge the adjoining surfaces of the os calcis and the astragalus are thoroughly dug up and the chips are allowed to remain. The flat gouge is then introduced between the astragalus and the sustentaculum tali posteriorly, digging up their articular surfaces, and then carried in a straight line forward through the head of the astragalus and upper part of the scaphoid; in this way a complete horizontal transverse section of the foot just below the malleolus has been made. The foot is then forcibly thrust back about $\frac{3}{4}$ inch and the wounds closed. The foot is put up in plaster in slight extension with the sole level. In flail knee, stability is secured by obtaining a slight degree of hyperextension. In severe cases of hip paralysis, arthrodesis of the hip may be resorted to.

Sayre⁸³ has had good results in the treatment of poliomyelitis with electricity.

He uses the smallest current that will produce muscular contractions. Painful applications of electricity are not wise. Massage and attempts at voluntary motion are essential, and, if necessary, this attempt at voluntary motion should be assisted by passive help. Fatigue must be avoided. Heat by the electric light oven is also valuable. Braces are essential at times, but they should be as light as possible, should not constrict the limb, and should fit accurately. In all cases they should be regarded only as temporary. If the paralysis involves the trunk muscles, scoliosis must be feared, and recumbency is the best treatment, either on a hard bed or on a frame; if the weakness persists, some form of jacket must be applied. The number of cases of infantile paralysis amenable to surgical treatment is comparatively small, and the majority is better treated by mechanical support. Deformities are corrected, and later, in suitable cases, the various operations suggested may be used to secure equilibrium and weight bearing. He has never had any success with nerve transference, and has never seen any cases which showed very good results.

H. W. Frauenthal⁸⁴ insists on the use of braces to support the paralyzed limbs, and condemns the use of plaster of paris because he says it constricts the limbs, prevents the necessary massage, and may cause serious sloughs. He begins treatment the second week. Pain may be controlled by warm baths or electric light baths. He also believes that high-frequency currents, x-ray or radium, should be used in an attempt to destroy the organisms causing poliomyelitis. He is most enthusiastic over the benefit derived from electricity in the treatment of poliomyelitis. He gives to the involved muscles a sinusoidal current, alternating with a combined galvanic and faradic current that contracts seventy-two times to the minute, synchronous with the heart beat, and he regards this periodicity as an aid in the effect. A detailed account of the method of administration is given. He also uses massage, hydrotherapy, and thinks that muscle training is most valuable.

Peckham,⁸⁵ in addition to the other methods of treatment, reports the use of the static wave current (in three cases of poliomyelitis) and a 500 c.p lamp. He had very good results in these cases. He feels that the treatment is logical and physiological, and should be given in the earliest stages.

Steindler⁸⁶ undertakes in his reviews the work done on the neurotization of paralyzed muscle and nerve regeneration. He then abstracts a series of experiments on dogs and cats, in which a portion of the anterior crural nerve was excised to prevent regeneration and the anterior tibial bundle of the sciatic nerve was transplanted directly into the vastus externus muscle. His conclusions are as follows: Direct neurotization in the sense of Heineke and Erlacher is indeed possible. The natural limits of physiological regeneration allow a motor nerve, directly implanted into paralyzed muscle tissue, to establish by regeneration the entire chain of neuromotor connections. From the experiments it appears that this regeneration becomes complete in from eight to ten weeks after the implantation. In close succession to the regeneration of nerve tissue, the muscle tissue also regenerates, and this becomes manifest in the reappearance of the normal contours of the fibers and the normal striations. Physiological test of the reneurotized muscles also shows that regeneration of the muscle takes place centrifugally from the point of implantation. In none of the experiments could we observe in a normal muscle any inclination to take nerve supply, though ample occasion was furnished to this effect. For this reason he is inclined to be rather skeptical in regard to the question of hyperneurotization. Apparently totally paralyzed muscles, in infantile paralysis, were found to contain a variable number of perfectly normal muscle fibers and a considerable amount of nervous elements. In regard to the clinical applicability of these facts, the author does not want to make a statement until one or two more points have been cleared up.

Whitman⁸⁷ says the causes of deformity are the force of gravity, persistent attitudes, unbalanced muscular action, weight-bearing, and locomotion. The prevention of deformity is the most important part of the treatment from first to last, for, if present, it prevents proper muscular action. It is prevented by passive motion and support. Massage baths and muscle training are of value. Electricity has not shown any positive evidence of value except as a stimulant to nutrition. Functional use, if properly regulated, is the most powerful of all stimulants toward recovery, as contrasted with purely local treatment. When the area of permanent paralysis can be determined, usually after several years, operative treatment may be indicated, and this is from the positive standpoint the most effective of all remedies. It consists essentially in operations to restore muscle balance or to promote stability. Home treatment is to be preferred, usually on account of the age of the patient, and must be adapted to what is called the ambulatory class. In the present stage of enthusiasm he is inclined to think that there is more danger of overtreatment than neglect.

MacAusland⁸⁸ gives a detailed description of the Whitman operation of astragalectomy. He states that the results obtained with astragalectomy have led him to discard, except in rare cases, all other procedures.

Baxter,⁸⁹ in speaking of the after-care of cases of poliomyelitis, thinks that only since the outbreak of the present epidemic has the social conscience been aroused to the necessity of caring for these cases. It seems to have particularly a social and economic import. There are many cripples to be cared for—not only relieved from suffering, but assisted in ways that would enable them to become wage-earners and to take their place as citizens. It has been found that the great majority of cases is not under skillful care. A committee is endeavoring to show these people that hospital and dispensary care is at their service, and it urges them not only to take advantage of the treatment offered, but to persist in it.

Shaw⁹⁰ said that the state (New York) had secured Dr. Lovett, of Boston, Dr. Armitage Whitman, of New York, and Dr. Hodgen, of Boston, to take charge of the after-care of the poliomyelitis cases, and that six nurses had been sent to Boston to study Dr. Lovett's methods of massage and muscle training. A series of clinics would be held each day for several months, starting near New York, where the first and greater number of cases appeared. A record of all the cases was kept, and they would be invited to attend these clinics through the physician reporting the cases. Dr. Lovett would examine all the cases and prescribe the treatment. The child would then be turned over to the family physician. Where the patients could not afford this, they would be provided with treatment free of charge. It was planned that no case in the state would be neglected.

Bartine⁹¹ says that the problem of after-care requires cheerful cooperation of all the hospitals and organizations interested in the work, and that a clearing house must be organized to prevent the roaming of patients from one clinic to the other, and to prevent the duplication of work and changes in the mode of treatment. In urging hospital care, however, we should not overlook the private practitioner, nor should he overlook the advantages of this movement for the ill and afflicted, many of whom eventually become crippled financially and their families impoverished, as well as in many cases becoming a burden on the community. To provide fresh air or convalescent home care and treatment for these children during a number of summers to come is one of the great problems that will soon be presented. It is quite essential that hospitals caring for these crippled children should have an adequate social service in an endeavor to follow the patients' progress, to study his home conditions, and to see that the physician's directions are followed. Many patients will not

return to a dispensary as often as their needs require unless encouraged to do so. This should be one of the most important phases of the work; otherwise the patient's progressive improvement may be retarded.

PROPHYLAXIS.

With the large number of cases and the wide extent of the epidemic of the present year, the question of prophylaxis and prevention is of prime importance. The *Journal of the American Medical Association*, in its "Therapeutics,"⁷² seems to cover briefly the suggestions made by most writers of general papers on poliomyelitis. It is quite probable that the so-called "distemper" which at times attacks dogs and may attack horses is really caused by this same infection. Hence a dog affected with distemper should be isolated and no child allowed to associate with it. While it has not been shown that flies will carry this disease, in all probability they may transmit the infection by their feet. Consequently, flies should be excluded by proper screens, if possible, from any animal that suffers from distemper, and certainly should be prevented from reaching an individual sick with poliomyelitis. It has been shown that this disease is contagious by means of the secretions of the mucous membranes of the nose and throat, and therefore every patient should be isolated and the disease made reportable to the boards of health. The nurse and the family should understand that the same care must be taken in destroying the contagium and preventing the contamination of articles and substances by the secretions of the nose and throat of a poliomyelitis patient as, it is so well understood, must be taken in a case of diphtheria. As soon as a case is reported to the board of health, the school board should be informed (as such cases are frequently in children too young to go to school), that they may send home from school the other children of the family, if there is an epidemic; perhaps the other children of that tenement. The incubation period is said to vary and may be as long as ten days, but, to be safe from causing infection in others, such children should remain out of school for two weeks.

Taylor³ suggests, as preventive measures, isolation and frequent spraying of the nasopharynx; for those in contact with the cases, proper protection of the hands, clothing, and the respiratory tract.

Flexner⁵ says that during an epidemic of poliomyelitis care should be exercised to restrict the distribution of the disease through kissing, spitting, coughing, or sneezing. Parents or nurses, in wiping the secretions from infected children's noses, may, if not careful, transfer the infection to other children or contaminate the food. The clothing and other parts of the body may become contaminated from the habit of carrying sick children around to comfort them. Flies also often collect about the nose and mouth of infected children and feed on the secretions, and they even gain access to the discharge from the intestines in homes unprotected by screens; thus becoming grossly contaminated they can deposit the virus about the nose and mouth of healthy persons and contaminate the food. Food exposed for sale, unless protected by screens, may become infected in this way. The best protection to the public can be secured by the discovery and isolation of those ill of the disease, and the sanitary control of those persons who have associated with the sick and where business calls them away from home.

Whittemore⁹² suggests the use of kaolin as a prophylactic measure, blown into the nose of every child or adult who has come in contact with poliomyelitis.

Manning⁹³ believes that an autopsy should be made in the case of every death during an epidemic, unless the diagnosis can be absolutely made, and he thinks that all public funerals during this time should be suppressed.

Robbins⁹⁴ believes in strict isolation, as in other infectious diseases, with a rigid quarantine for those associated with the patient. He also hopes that the

handkerchief will be replaced by the Japanese paper napkin, which can be burned when it has been used. He thinks that the handkerchief is a fruitful source of infection.

Sophian⁹⁵ describes the preventive campaign planned and rigidly enforced at Bridgeport. He advocates quarantine of the sick and healthy contacts; exclusion of probable carriers from New York and adjoining cities in which the disease was epidemic; establishment of a central hospital to which was enforced compulsory removal of all patients with infantile paralysis; organization of a special medical poliomyelitis squad; mobilization and enlargement of all sanitary forces, covering the street cleaning department, garbage department, police and fire departments, regular sanitary inspectors, and the staff of nurses. A campaign of education was instituted, and a house to house canvass made, in which patients were instructed in the principals of hygiene and sanitation. Especial attention was given to prevent the collection of children in crowds. A fly swatting campaign was instituted and the antisputting law (including the streets) was rigidly enforced. Every force—medical, sanitary, and civic—must be mobilized to meet this disease.

Bryant⁴¹ believes that nasopharyngeal infection with the organism of poliomyelitis is a common means of the spread of the disease. He suggests the management of the nose and throat, with the end in view of making the pharynx a poor culture surface for the virus. Care of the pharynx should be made a routine matter; the public should attend to the condition of the nose and throat in the same manner as it attends to the care of the teeth. He suggests that persons coming in contact with cases of poliomyelitis positively require nasopharyngeal treatment to keep them from becoming carriers and disseminating the disease to others. The treatment consists in the use of sprays, applications through the nose, and insufflation of powders through the nose.

As yet very few statistics of value have appeared on the epidemic in New York and the East last summer. Ogilvy,⁹⁶ early in the epidemic, published some data which were necessarily incomplete. The preventive measures at that time were also given. Physicians were asked to follow up carefully all suspicious cases. Parents with ailing children were asked through the press to seek competent medical advice, even for which might appear to be minor ailments. In all cases of running noses or cold in the head and the nasal discharge should be carefully looked after. The papers published the following instructions: Keep children out of the streets as much as possible, and be sure to keep them out of houses on which the department of health has put a sign. The daily paper will tell in what houses the disease is. This is the disease that babies and young children get. Many of them die, and many who do not die become paralyzed for life. Do not let your children go to parties, picnics, or outings. If your child is sick, send for your doctor or notify the board of health. For the first time the board of health saw fit to quarantine the infected houses. All cases must be removed to the hospital unless the patient could receive as good care as at the best private hospital.

At a conference of public health officers with the United Public Health service on poliomyelitis, held in Washington,⁹⁷ uniformity of procedure looking toward the prevention of the spread of the disease from state to state and from one community to another within the same state was recommended. Rules were laid down for quarantine with the assistance of the United States Public Health Service. All cases of poliomyelitis should be reported at once, and these should be transmitted to the Public Health Service in weekly reports. Before persons 16 years of age or under be allowed to leave the restricted area, they must be provided with a health certificate, and notice of this certificate should be sent to the health officer at that state of destination. These must be based on medical inspection, and be void unless the trip begins within twenty-four

hours, and must be signed by properly authorized persons. Common carriers should be instructed to inform travelers of these regulations. Persons under 16 years of age who have moved from one community to the other should be inspected daily for two weeks from the date of the certificate. For local control, certain minimum requirements were suggested. Every known or suspected case should be immediately reported and the house placarded; the minimum quarantine to be six weeks, and after that the patient is to be excluded from school and public gatherings for two weeks more. Adults living in infected houses can remove therefrom by permission when properly disinfected. Children cannot be removed unless they are going to a house in which only adults reside. Such children must remain on the premises and the house be under observation for two weeks. School children and teachers who have been exposed to poliomyelitis must be quarantined for two weeks and until after disinfection of persons and clothing. When schools are closed on account of poliomyelitis, children under 16 must remain on their own premises. If poliomyelitis occurs in premises where food stuffs are for sale, these cannot be removed until the quarantine has been removed and the premises and food, etc., disinfected. No article should be removed from infected premises or be exposed to airing without permission. School and library books should be burned. Domestic animals in contact with patients should be disinfected and removed to an outhouse. The usual screening and disinfection of excreta, etc., should be observed. Public assemblies should be prohibited. The most careful hygiene and cleanliness should be observed.

STATISTICS.

From June 24 up to the present time some report of the progress of poliomyelitis in the various states, and especially in New York, has appeared in the Department of Medical News in the *Journal of the American Medical Association*. In this number the first report of cases in Brooklyn was made. These include statistics, reports of clinics, rules for quarantine and the prevention of its spread, provisions for clinics and the after-care, and provisions to prevent the recurrence and the spread of the epidemic through the country next year. Last summer epidemics of more or less severity were recorded from New York, Illinois, Indiana (15 cases in Indianapolis), Maryland, Pennsylvania (July 1 to October 5, 1,163 cases and 414 deaths, 876 cases in Philadelphia), Canada (122 cases and 17 deaths from September to December), Washington, Massachusetts (estimated 100 deaths and 1,892 cases from January, 1916), Wisconsin (459 cases since July), Iowa, North Dakota (17 cases, 6 deaths), Connecticut (677 cases), New Jersey (3,495 cases, 775 deaths).

In New York⁹⁸ the true cases of poliomyelitis numbered 8,927, and the total number of deaths, 2,343, or a case fatality of 26.24 percent. From August 21 to October 13 there were discharged from the hospitals of the department of health 2,058 patients. Of these, 66 percent showed evidences of paralysis of some degree, 18 percent showed that paralysis had wholly disappeared, while 15 percent had not shown paralysis at any stage of the disease.

In New York state, exclusive of the city, up to September 15 there were 2,785 cases and 318 deaths.⁹⁹

In a careful study of 4,474 cases that had been reported as poliomyelitis and treated in the board of health hospitals it was found that there had been an error of diagnosis in only 1 percent of the cases.¹⁰⁰

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ORIGINAL ARTICLES.

GET FAT—AND DIE.¹

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Because seemingly one of their plain sociologic duties, it would be very well if the medical profession, never yet any too fond of systematically instructing "the laity" in matters of prophylaxis and of hygiene, could be induced at least to start the education of the hundred million in regard to *the protean seriousness of wholly needless obesity*. Really few topics are of more pressing importance in the personal and the social economy, yet only some of us have taken the time and the thought to realize this importance.

From the young mother who covets a prize in the baby show for her unhealthily fat infant to the "portly" millionaire bank director not yet on the verge of the almost certain breakdown, intelligent multitudes still think body-weight a sure criterion of health—a delusion which the profitable slot weight-machines continually press into the subconscious aspect of their minds. But, in fact, the heedless young mother in question should have "three months" instead of the three dollars of her prize, and the business man only illustrates once more how easily a mortal may gain the whole world and lose his own—life unduly soon. To be a real, a human, personality, to be "captain of one's soul," one should at least be willing and able to maintain in dignity the conventional semblance of humanity. Indeed, the continuous attainment of this end, under adverse conditions in particular, is a capital criterion and measure, moral and physical, of the man.

When one looks around and at his fellows whose heredity and habits he knows somewhat, it is clear enough that some are born fat, some achieve fatness, and some have fatness thrust upon them.

With those who, in scientific fact, are *born fat*, our immediate interests can have no quarrel; rather must we quarrel with these unfortunates' forbears, and urge on the children the importance of the prophylactic physiology of the ductless glands, the thyroid probably in particular. Pathological obesity undoubtedly looks more and more as if it were due to a disturbance in the katabolism of carbohydrates and of fats, due to some still unknown defect in

¹This article was originally in the form of a letter to the editor.

the metabolic apparatus. Van Noorden, a high "authority," terms this "endogenous" corpulence, but so far has not given the world the long-sought secret of its cure. It has recently been shown that unusual smallness of the lungs (thus minimizing the destruction of fat) is another factor in the tendency to obesity, whether of the physiologic or the pathologic type. By adequate systematic exercise of the proper kind the lungs may readily be much enlarged and the accumulation of fat be prevented or lessened sometimes to any desired degree. Unfortunately this "sometimes" involves favorable conditions of metabolism, of opportunity, and of will-power which knows not of discouragement. But, after all, folk born fat are patients for the physician.

The great and culpable majority of the obese *achieve* their uncomplimentary fatness. It is these, then, that the new education (now already glowing just beyond our horizon) must particularly illuminate and orient in the "Land of Happy Living." These people, or most of them, are quite needlessly unhappy because inefficient, and, if they persist, as needlessly short-lived. Unnecessary here and superfluous were the descriptive trouble and the eloquence which might forcibly set forth the abundant details of this inefficiency, of this unhappiness in consequence, and this shortening of life. Even the insurance companies, strangely enough, have never yet made it their business to teach to the millions of people actually and potentially on their books this essential factor of how to live. The inefficiency is, however, so plainly obvious everywhere, and the lowering of life expectancy for the obese so universal and so considerable, that it cannot but be wondered that this point of common life philosophy has been so generally overlooked, not to say ignored.

Underlying the matter is the doctrine of the metabolic planes of efficiency, recently summarized,¹ ready for us here, in the *New York Medical Journal* of April 15 of this year. Let us repeat it:

There may be said to be three metabolic planes of efficiency, based on the nutritional condition of the organism. By this term is meant the balance of metabolism, a balance of many strongly opposing conditions. We can have a high or a low plane of efficiency; and we can be in a low, medium, or high plane of efficiency and be physiologically *correct*. Whether the metabolism is greater or less determines what the plane of efficiency shall be.

Let us consider a moment, first, the *lowest* plane of efficiency of the normal individual. We find an illustration in a person who is just recovering from an exhausting illness, such as typhoid fever or pneumonia, or a severe childbirth. Such a person is on the lowest plane of efficiency. Metabolically speaking, the plane has gone down while the person was ill. Many such persons have distinct memories of the shock of trying to walk and finding that their legs, from absolute weakness, would not support them. Another example is that of a paralytic lying in bed for years and years, eating little food and expending very little energy. His intake of food has been low and his outgo of energy has been correspondingly low. This is the very lowest logical plane

¹Advance copy from a forthcoming work, *The Physiology of Exercise*.

of efficiency. So far as the plane is concerned, that may be normal living for that individual at that time. There is no reason why a person should not live for years on a milk diet, making only absolutely necessary movements. So long as expenditure of energy does not exceed the intake of nutriment, or vice versa, that is a normal condition so far as metabolism is concerned. If a person takes too much nutriment, more than his organism uses, he "suffers from the lack of exercise," and many different things, more or less serious, result from this lack. The same thing might be true in a very sedentary person, such as a clerk at a desk. If he ate too much, more or less serious results would follow. His intake and outgo of energy must be equal, and then all is well and physiologically correct from a clerk's standpoint.

The *middle* plane of efficiency is the average condition of the average sedentary man and of most women. Clerks in dry goods stores, bookkeepers, and all sorts of people who are still most of the time, and who never think of taking exercise for the sake of exercise, would fall under this class; and many professional folk. Here, again, as long as the intake of fuel or nutriment corresponds to the outgo of energy, the person is living a normal sort of life. A clerk in a store is not suffering very much from the lack of exercise, but, if he should eat two or three times as much food, or exercise twice as much and eat half as much food, there would be trouble. As long as he eats a reasonable amount, he can live a very inactive life, and a long and healthy one perhaps. Only when such a person eats too much or too little is there trouble.

The man who becomes rich and retires from business is frequently an illustration of the lack of balance. The man who hustles from 8 a. m. until 5 p. m., makes his pile, buys an automobile, joins two or three clubs, largely increases his eating because he has more time and more money, exercises less, thereby *breaks the balance of efficiency*, the result being perhaps arteriosclerosis or some other ill; he "goes stale" and ends his life years, often ten, before he needed to end it. Here is a defect in the balance of the plane of efficiency.

The third or *highest* plane of efficiency we will consider from the standpoint of a lumberman in the Maine or Nova Scotia forests, working often in the water, often with the thermometer at ten degrees below zero working from daylight often long after dark, and doing more than three times as many horse power of work as the sedentary man. He could not stand it a week unless he ate three times as much food. He is sure to be living on a normal physiologic plane and a plane obviously much higher.

Another example of the third or highest plane of efficiency is the athlete in training in college. The athlete is, however, at a disadvantage in comparison with the lumberman, for the trained athlete is almost always overtrained and lacks the hygienic basal conditions which make the work of the lumberman, however hard, an ideal physical condition. But, as regards the intake and outgo of energy, both the athlete and lumberman are living on the highest plane of efficiency.

Observe that a change of plane upward is *beneficial*; and there are few men, aside from the discomfort at first of the vigorous labor and of working long hours, who would not *enjoy* life more as a lumberman than as a clerk. A change downward, however, especially if sudden, is dangerous. This is often seen when college athletes, after graduation, give up all physical exercise. Their lung capacity decreases and they are likely to have tuberculosis. A change downward from one balanced plane to another is attended by considerable risk, unless it be done very gradually, so that the organism becomes adapted to the lower plane of efficiency. If the change is too rapid, there will be chronic staleness, which we might properly discuss under the head of fatigue.

Metabolic balance is essential, thus avoiding the Scylla of obesity (tending

to incapacity and early death) and the Charybdis of hypoliposis, with its unattractive and dangerous malnutrition and weakness.

Physiological obesity can always be reduced (as long as the lungs, heart, and the other vital organs are sound and can stand the pressure) by a greatly increased amount of systematic exercise and by a reduction in the intake of food, the latter the more important. Increase the outgo of energy from the organism and decrease the intake of energy into the organism, and it is always possible to reduce truly physiological obesity. This is one place where a contrast appears between pathological and physiological corpulence. In many cases of physiological obesity the persons have weak hearts, stomachs, or kidneys, and these weaknesses properly prevent either a rapid decrease in the food or a rapid increase in the amount of fat-destroying exercise. Then, too, some unstable nervous systems cannot stand a quick decrease in the energy value of food, so that it is not safe to decrease the food supply too rapidly.

Most of the false obesity cures bring about their effects, if there be any at all, by actually disturbing and deranging the process of digestion by a distinct pathological change, while they do not attempt to remove the cause of the superfluous amount of fat.

One way to remove the cause of physiological obesity is to reduce the metabolism of food. Give the person foods that are "filling," such as bran bread and fruits and top-of-the-ground vegetables, whose tissue-forming value is small, very small, as far as calories of energy are concerned. Cellulose and water! Another method of bringing about the same result is to drink a cup of sweet, weak coffee or to eat dessert or a few pieces of candy first, so that plainer foods become tame and unpleasant to the taste, and easily foregone. Some find it easier to omit all food one day, or even two, in every week, water being meanwhile freely taken.

Because the method puts one on his own feet and makes him master of himself, perhaps the most important way in which to reduce diet is to use continuous will-power of restraint. Very few of really fat people have sufficient will-power, however, month after month to reduce the diet in a systematic and scientific manner. Most of them, lacking the necessary strength thus to lessen their food, go to sanatoriums and there are put under strict surveillance as regards everything pertaining to their diet. For quite a percentage of far-overweighted persons it is either this heroic treatment, passively endured, or nothing.

One thing is certain. For the far larger number of persons overweight who do not find it expedient to change their actual daily occupations from a low plane of energy expense (via muscular exercise) to a higher it is quite futile to expect weight reduction by bodily work alone, whether in a fine gymnasium, on the farm, or

elsewhere. The commoner experience of middle-aged women and men who seek thus to normalize themselves hygienically and cosmetically, of course, is to *gain weight* rather than lose after the first week or so. They actually improve their general condition, as well as their food appetite, so much by the daily hour or two of unwonted highly enjoyable general exercise that their metabolism is raised so that they "put on" fat. They take just enough exercise to normalize nutrition, but not nearly enough to burn up any tissue fat. But forty-eight hours a week of labor for each of the four weeks of several months would do it! And it is thus, and only thus for the most part, that the million retain the semblance of the properly human form, for their diet, for the most part, otherwise would be excessive.

Those who have *fatness thrust upon them* are the adipose victims of circumstances. Some of these are, of necessity, engaged in oversedentary occupations; some are helpless cripples; some are ignorant; some are of indifferent—i. e., of swinish disposition; some are wise, but weak-willed; and some are strong-willed enough, but foolish or perhaps indifferent to the length of life or to the full measure of physical and moral manhood or womanhood. But with this, although a considerable class of the obese, we need not here concern ourselves, for the scientific conditions are like unto those of the persons who achieve fatness—although, humanly speaking, far harder, because less often relieved. Yet these too might readily be free—free of being inefficient; free of suffering unduly in a warm atmosphere year after year; of manifold personal dermal discomforts; of shortness of breath; of sundry dangers from accidents; free, finally, of the mathematic probability of death a number of years perhaps before their time were they of normal weight. Does this fact not mean much?

But, after all, the problem for the portly multitude of men and of the all-too-"motherly" (?) multitude of women is one of *general essential expediency plus human personality itself!* To be fat is *grossly inexpedient* if only the people knew it, but to conquer the fatness, humorous index of ignorance or sensuality for the most part, is to rise thereby to the full stature of the human, fashioned in the godlike image of superman. The victory is easily attained when conditions are not too adverse, and it is one which tends to satisfy the vanity or the pride in the dignity of the human form; it augments efficiency and tends to the prolongation of one's years. It truly is strange that still so few effectively realize these things. Who is the good twentieth-century prophet that, in tones which all may hear, will proclaim the wrong, its utter needlessness, and the manner, often easy enough, of its righting?

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CONGENITAL DISLOCATION OF THE HIP.

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The bilateral or unilateral malformation of the hip, which clinically passes under the name of "congenital dislocation of the hip," has been the subject of some interesting discussions within the last few years. It is our purpose in this paper to briefly review some of these opinions, and to follow this with a recital of our own experience with thirty cases, setting down finally our own views as developed from this clinical experience.

ETIOLOGY.

We are inclined to agree with the opinion expressed by Gourdon¹ that the term "congenital dislocation" does not describe accurately the various conditions involved. He asserts that there is no dislocation at the hip until the child begins to use its limb. The child is born with factors that entail a dislocation at the hip later in life. He gives the history of two cases that illustrate this point of view, and cites further a very interesting test for determining abnormal movability at the hip in the early years of life.

In our own series of cases we have had four hips in children, aged 18 months, 22 months, and 2 years respectively, in which there was but slight displacement of the femoral head and an abnormal laxity at the hip articulation. This view is still further strengthened by the observation of Falk.² He has gone over a number of spines and pelves which showed anomalies of development and which either lead, or no doubt would lead, to various deformities, corroborating Bohm's contention that many cases of lateral curvature are due to anomalies in the spine. Similar anomalies in the structure and development of the acetabulum lead to dislocation of the hip in the early years of life. Le Damany³ has added what seems to be a rational explanation of this variation in the stability of the hip articulation. During intrauterine life the acetabulum of the fetus is subject to a decrease in depth from that of a hemisphere at six months to that of about a third of a sphere at term. After birth the cavity deepens until it becomes slightly more than a hemisphere. The femur develops torsion of the neck on the shaft, which occurs at the superior line of ossification, causing a rotation amount-

ing to 35 degrees at term. These two malformations arise probably from the same mechanical cause. The pressure of the wall of the uterus on the knee of the fetus brings a counter pressure of the shaft of the femur on the anterior part of the ilium. The femur thus becomes a lever of the first class, with the result that the pressure of the head in the acetabulum is decreased and its neck, which because of its fixation is less movable than the shaft, remains more or less fixed, while the shaft rotates upon it. This malformation of the femur and acetabulum produces dislocation only after birth when the child unbends itself for the erect posture. In boys the shape of the pelvis, narrow below in proportion to the top, causes the acetabulum to be directed strongly downward. In girls, however, the pelvis is proportionately broader below and the acetabulum consequently more vertical. This accounts for the predisposition of the female sex to congenital dislocation of the hip. Emmett Rixford⁴ has examined the gross specimens of three cases—one a nine months' fetus, one a seven months' premature birth, and one a museum specimen. He believes that, given an intrauterine force which would tend to extend the pelvis of the fetus, with resistance to downward pulling of the thighs, such as a rigid uterine wall, small fibroid, legs in extension feet caught over the arms, forehead, or shoulder, this force would pull the pelvis away from the femur and stretch and displace the head of the femur upward and backward.

The part that heredity plays in this malformation has been investigated by Hayashi and Matsouka.^{5,6} They have gone over 230 cases, and found only 19 with an apparent hereditary influence. These same authors have studied their 230 cases with the view of discovering the occurrence of other deformities associated with the malformation at the hip. They found about 25 cases in the 230 that showed other congenital abnormalities, the commonest of which was congenital contracture, and next to this deformities of the feet. In the literature they have reviewed 140 cases where associated abnormality existed, and found that club foot, genu recurvatum, spina bifida, and torticollis were the most frequent deformities, the order of enumeration being that of the frequency of occurrence. It seems to us that, from these two observations, hereditary influence and also the occurrence of associated deformity are negligible in a consideration of this malformation at the hip. Gangolphe and Plisson⁷ have reported 8 cases in which the hip was not dislocated clinically until adult life—that is, between 25 and 45 years of age. They name this condition latent subluxation of the hip. This is an interesting observation on the etiology and development of congenital hip dislocation.

PATHOLOGIC ANATOMY.

The pathologic anatomy of this malformation is of more significance, as it bears directly on surgical efforts to correct the deformity.

Schede⁸ has made observation on two specimens of this condition. The acetabulum is triangular, with the base below, and it has flat edges. The change in the shape of the acetabulum is due to the pull of the capsule upward. This also accounts for the shifting upward of the point of insertion of the ligamentum teres. The absence of normal pressure of the head in the acetabulum causes the flattening of its edges. In infants the head of the femur was retroverted; in adults, anteverted. In both specimens a medio-posterior flattening of the head was found. Durham⁹ has examined 200 normal femora to determine the frequency and extent of anteversion of the neck. He found that the amount of anteversion varied from 0 to 35 degrees; the greatest number being between 2 and 20 degrees, with a general average of 11.9 degrees. Anteversion was absent only in 9 percent of supposedly normal femora. As a result of this study, Durham believes that anteversion up to 35 degrees probably will not interfere with maintenance of reduction in congenital dislocation of the hip, but that more than this, especially when it approaches 45 degrees to 90 degrees, is largely responsible for the number of anterior transpositions obtained after attempted reduction. He advises osteotomy of the femoral shaft in those cases in which reduction cannot be maintained after a fair trial. Sherman¹⁰ has found in his extensive experience that the chief factors which prevent satisfactory reduction of the dislocation are the incompetent acetabulum, the imperfect femoral head, which is frequently twisted so that the head is directed forward, and the contracted capsular ligament. He believes that, should the head be twisted forward it is advisable to do an osteotomy below the trochanter and bring the thigh into proper line. In 29 hips reduced by incision with no osteotomy following he had 41.3 percent success. In 27 hips reduced by incision with osteotomy following he had 70.3 percent success. Hibbs¹¹ is of the same opinion, believing that the anteverted femoral head causes most of the failure in reduction. He advises osteotomy on the lower third of the femur. Nové-Josserand¹² dwells on the importance of changes in the acetabulum, especially after reduction of the dislocation. He obtained the specimens from three cases that had been reduced sufficiently long to show changes in the content and depth of the acetabulum. He compares these with the acetabulum removed at autopsy in an unreduced case. He states that during the first few weeks after reduction the pressure of the replaced head slightly deepens the cavity; during the next period a cartilaginous rim is developed at the posterior border of the acetabulum, which is solid

enough at the end of eight months in an average case, to allow normal use of the joint. In the third period a slowly proceeding ossification develops, which is complete only after some years. He gives no exact explanation for the development of the posterior rim after reduction, but believes that it is due to pressure of the femoral head. Full bony reorganization of the acetabulum is shown by x-ray studies to be long delayed—six years in one-fourth of the cases. Bade¹³ has called attention to the occurrence in reduced congenital dislocation of the hips of arthritic changes, notably osteochondritis deformans juvenilis and so-called arthritis deformans juvenilis. Lance¹⁴ believes that the consensus of opinion in the last decade has favored operation not earlier than at 2 and not later than at 9 years, and preferably not later than at 6 years, basing his opinion on cases operated upon by himself and others previous to the second year. He believes that reduction should be accomplished as soon as the diagnosis is made. Hull¹⁵ has written a plea to medical men in general to be on the alert for these cases early, pointing out that, when these cases are treated early, the result is usually very satisfactory, and that in single cases one gets improvement, but imperfect results, after the child is 7 or 8 years old, and that the same is true of double cases after they are 6 years old. He strongly advises medical men not to tell mothers that their children will outgrow a painless limp.

REPORT OF CASES.

In our own series of cases, which will now be reported, we have found in the main that in young children reduction presents no great difficulties, that the reductions in a large majority of cases are retained without difficulty, and that the child develops a normal hip articulation which is perfect for weight bearing and motor function. As the child's age advances, the difficulty in reduction increases disproportionately, and the result is subject to a corresponding degree of imperfection. We feel that it cannot be too strongly emphasized that reduction should be made as soon as the diagnosis of the condition is established, and we are able to state that we have had very little more difficulty in handling a child of 18 months than is ordinarily encountered in handling a child of 2 years, as far as the after-treatment is concerned. The time gained seemed to be distinctly to the child's advantage in the normal development of its hip. We do not feel that the age should be taken as an actual index, but that the child's muscular condition is a more definite guide to the possibilities of reduction. Some children of 6 years present less difficulties to manipulative reduction than do other children of 4 years.

It is not our purpose in this paper to touch at all on the simple procedure of manual replacement of these dislocated hips in young

children. We will pass on, after giving our results in these cases, to the more difficult cases that have passed what is ordinarily regarded as the age limit for interference in this condition.

CASES REDUCED BY MANIPULATION.

We have had 20 cases that have been operated upon by manipulative methods. Of these 6 were bilateral and 14 unilateral, making 26 dislocated hips in all.

The operative procedures used have been, in most instances, forcible traction on the Bradford device for congenital hip reduction. In certain cases where this has not accomplished reduction speedily, we have used the Lorenz method of forced abduction, and in a few instances the method of Gwilym Davis.

Age.—Our youngest case was 16 months old, with a single dislocation and very slight displacement. Our oldest case was 8½ years old, also a single case. Between these extremes we have had 1 case at 18 months, single; 1 case at 20 months, single; 2 cases at 24 months, both single; 4 cases at 3 years, single; one case at 5 years, double; 1 case at 6½ years, single; 2 cases at 7 years, both double; 1 case at 8 years, double; 1 case at 8½ years, single.

Sex.—Of these nineteen cases 8 were male and 12 female.

Results.—In the bilateral case that had reached 8 years of age considerable difficulty was met in reduction. The two hips were reduced at separate operations; first the left hip was reduced, and two weeks later an attempt was made to reduce the right hip, which failed. Two weeks after that the right hip was reduced by the Lorenz method. Each of these operations was attended by considerable shock to the patient. The final result was replacement, with good weight bearing function in both hips.

In the single case that had reached 8 years of age, there was surprisingly little difficulty in reducing the hip on the Bradford device, and the result was stability, with good function.

In the two cases that had reached 7 years of age, both bilateral, no difficulty was encountered in reducing either of them, and in one case both hips were reduced at the same operation. In the other case a week intervened between reduction of the hips. The method here used was the Lorenz procedure on two hips and the Bradford traction device on two hips. In one of these cases the results were perfect weight bearing and function in both hips. The other case died suddenly from a cardiac condition five months after operation.

In the cases under 7 years of age no difficulty was encountered, and they were all reduced, most of them on the Bradford device; some of them by either the method of Lorenz or Davis. In the children under 2 years of age, especially those at 16 or 18 months, the reduction was a very simple procedure. The radiograms in these cases showed very little upward and backward displacement. (See

above reference to the opinion expressed by Gourdon.¹) In one case of 18 months, a single dislocation, the neck of the femur was fractured after the head had been replaced in the acetabulum by a continued effort at stretching the adductors. The entire limb was immediately placed in plaster in 45 degrees abduction of the thigh, and union took place after six weeks in good position. The hip has since been stable and functionally perfect.

After-treatment.—The average duration of after-treatment has been about two years from the time of reduction. Some cases have been lost sight of after seven months, and others have continued under observation for five or six years.

Remarks.—In this series of 26 hips we have not failed to reduce the dislocation in any single instance.

One case with bilateral dislocation died of intercurrent disease, and one case sustained a fracture of the femur.

We feel that manipulative reduction will be successful in all cases of congenital hip misplacement if the child is treated in its early years. We feel that these hips should be reduced at the earliest possible time—that is, as soon as convenient after the diagnosis is made.

We prefer the Bradford traction device or Hawley table for simple reduction for the reason that the limb is not necessarily placed in the position known as the "frog position," which is associated with the Lorenz procedure. We feel that the "frog position" favors redislocation when attempts are made to bring the limb down to a weight-bearing attitude; consequently there is an advantage in placing the thigh in abduction to about 50 degrees, with the leg in a position to be walked upon during the early months of after-treatment.

We also feel that the period of plaster fixation can in many instances be materially reduced. In some of our single cases the patients were in plaster for but six months. After this they received massage and gentle manipulative treatment carried on under the direction of some one thoroughly informed as to the extent and limitations of their efforts.

CASES REDUCED BY OPEN OPERATION.

The remaining cases in our series had passed the period where manipulative efforts at reduction promised any chance of success. In this group the youngest patients were 7 years of age, and the oldest was 25 years of age. In all of these cases, ten in number, the amount of shortening, the muscular development of the individual, and the previous experience with attempted reduction by manipulation prompted us in the belief that open operation was indicated.

Age.—Two cases at 7 years, one double and one single; 1 case at 8 years, double; 1 case at 8½ years, single; 2 cases at 9½ years,

both single; 2 cases at 10 years, both single; 1 case at 15 years, single; 1 case at 25 years, single.

In this group of cases operated upon by open operation there were twelve hips seen in 10 cases, 8 unilateral and 2 bilateral.

Sex.—Three of these patients were male and 7 female.

THE OPERATIVE PROCEDURE USED IN OPEN REDUCTION OF CONGENITAL DISLOCATION OF THE HIP.

We have performed an operation of cutting down upon the hip in cases where it seemed ill-advised or impossible to replace the hip by manipulative procedure. The patient to be operated upon is placed upon a strong traction table, with the perineum resting against a well-padded perineal post. Each leg is then attached to a traction appliance, which is manipulated by a strong ratchet pull attached to a boot laced on the lower leg. The operative field is then prepared and the sterile coverings are fastened to the patient, so that the limb can be manipulated without displacing them.

We have found the best approach to be from an anterior lateral direction. An incision is made from the anterior spine of the ilium running downward along the course of the sartorius muscle to a point at the mid line of the anterior surface of the thigh; the skin and subcutaneous tissues being divided, the external border of the sartorius muscle is exposed. The space between the rectus femoris muscle and the tensor vaginæ femoris is then entered by blunt dissection; the intramuscular septum being split quite freely. The sartorius and rectus femoris are then retracted strongly inward and upward, and the tensor vaginæ femoris retracted outward and downward; the iliopsoas insertion into the lesser trochanter is then divided and the anterior capsule is split across toward the unoccupied acetabulum; great care being exercised to divide the pubo-femoral and the iliofemoral thickening bands of the capsule. With free division of these structures it is usually possible with strong traction to reduce the head into the acetabulum. We have found in most of our cases that this can be done without great difficulty. In others we have found it necessary to exert very powerful pull upon the affected limb, at the same time tightening the pull on the unaffected side, so as not to allow the pelvis to tilt. After the acetabulum has been cleaned of fibrous tissue and the head reduced, we have found practically no tendency in most of our cases to re-displacement. In several cases it has been necessary to employ strong internal rotation of the femur.

It has been our custom to close the wound with interrupted silk sutures and to apply a plaster of paris cast immediately without changing the position of the patient.

Note.—In the following clinical records the operative procedure

above outlined has been used, and is referred to as the "operation by anterior route."

CASE I.

Minnie O., aged 7 years. Past history good, family history negative. Limp and peculiarity of pelvis noticed when she began to walk at two years of age.

Diagnosis.—Double congenital dislocation of hips.

Physical Examination, W. D. and N.—Walks with characteristic waddle, extreme lordosis of lumbar spine, palpable prominence of both trochanters, lower extremities adducted and internally rotated. Actual shortening 2 inches on both sides.

Radiogram.—Shows well formed head and acetabulæ.

Treatment.—Manipulative reduction of right hip on March 31, 1911, after manner of Lorenz. Left hip failed of reduction. May 5, 1913, right hip in place, left hip out. May 19, 1913, left hip cut down upon through anterior route, acetabulum filled with fibrous mass. Head could not be reduced, but was placed in anterior transposition. Child stood operation poorly, considerable shock. Recovery uneventful. Wore plaster for one year. Had massage and manipulation for one year.

Present Status.—January 7, 1917. Good function, left lower extremity externally rotated, weight-bearing good. Walks well and does not tire easily. Lordosis corrected. Thighs abducted. Radiogram shows new acetabulum formation slightly above and in anterior position.

Result.—Anterior transposition, with good function.

Note.—The difficulties in this case were extraordinary, due to the shortening and adaptive changes in the upper end of the femur in spite of the age.

CASE II.

Helen C., aged 8 years. Family history and past history unimportant. Always walked with limp. Walked late.

Diagnosis.—Double congenital dislocation of hips.

Physical Examination, W. D. and N.—Extreme lordosis of lumbar spine. Gait, double duck-like waddle. Heads of femora prominent, posterior and above normal position. General muscular development above normal for age. Actual shortening 2½ inches, both hips.

Radiogram.—Good acetabulum on both sides, heads well developed, and posterior in position.

Treatment.—February 28, 1912, manipulative attempt, failed entirely on both sides. April 11, 1912, open operation after method of Ludloff. Patient's thighs in frontal plane abduction. Operation upon right hip, reduction not accomplished. Wound closed. June 20, 1912, open operation upon left hip. Incision made, posterior capsule opened. Acetabulum small and shallow. On manipulation, head of femur, which showed anteversion to high degree, marked coxa vara, was broken off. Upper end was smoothed off and placed in acetabulum. Good recovery. July 3, 1912, open operation on right hip. Same operation and same findings. Posterior superior rim of acetabulum very deficient, head reduced. Markedly shocked by operation. September 5, 1912, plaster removed. Motion in both hips. January 8, 1913, walking about with support. January 31, 1913, feet can be approximated to within 12 inches of each other. Walk without support. February 5, 1913, discharged from hospital. October 1, 1916, patient walks well, holds thighs abducted and slightly externally rotated, good motion in both hips, can sit and stand comfortably. Knees cannot quite touch in standing. Lordosis corrected.

Result.—Double excision of femoral heads, with motion and improvement in stability, and standing and walking.



Fig. 1.—Double congenital dislocation of the hips.



Fig. 2.—Single congenital dislocation of the hip.



Fig. 3. Single congenital dislocation of the hip, reduced by manipulation in young child.



Fig. 4.—Single congenital dislocation of the hip in child four years of age. A, before operation; B, after operation.



A



B



A



A



B

Fig. 5.—Double congenital dislocation of the hips. A, before operation; B, after operation. Reduced by manipulation.



Fig. 6.—Drawings of specimen removed at autopsy. A, the thickening of posterior capsule in characteristic deviation of head and neck; B, the importance of the anterior bands of the hip joint capsule in preventing manipulative reduction in older cases. In our experience it has been necessary to cut these two bands shown in this figure.



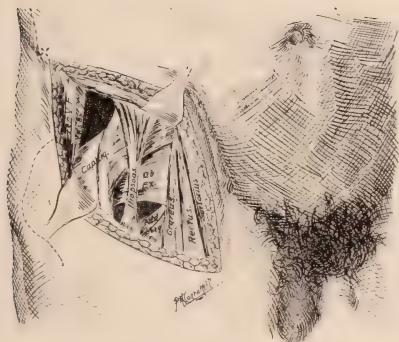


Fig. 7. Diagrammatic drawing of the exposure in the anterior lateral route of reaching the hip joint.



Fig. 8.—Traction table for producing powerful traction in drawing down the femur in order to replace the head. The operation is done with the patient placed upon this table, the field covered with sterile surroundings, and an assistant not in the actual operative field manipulating the traction windlass.

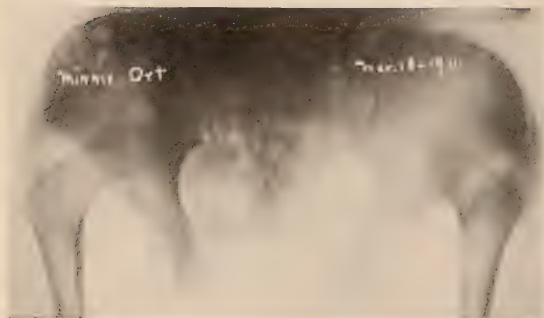


Fig. 9. Case I. Before operation.



Fig. 10. —Case II. Before operation.



A

B

Fig. 11—Case III. A, before operation; B, after operation. Reduced by open operation.



Fig. 12.—Case V. Before and after operation. Done by open incision.



Fig. 13.—Case VI. Photographs before operation. Radiographs before and after operation by open method.



Fig. 14.—Case VII. After reduction. Reduction by open operation. Point marked by A on the radiogram is point where head of femur rested on the ilium before operation.

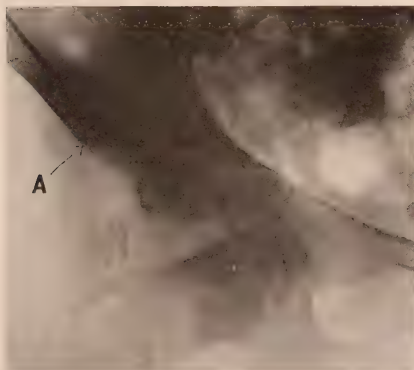


Fig. 15.—Case IV. Reduced by open operation. At point marked A in the radiogram is seen fairly well-developed new acetabulum cavity.

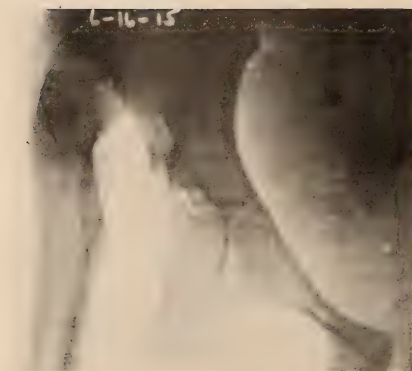


Fig. 16.—Case VIII. Before and after reduction by open operation.

CASE III.

John F., aged 15 years. Family history and past history unimportant. Parents noticed limp at two years and associated it with a fall from a wagon.

Diagnosis.—Single congenital dislocation of hip, left.

Physical Examination.—Muscles fairly developed. Head of femur high on dorsum of ilium. Thigh (left) flexed a bit. Adducted and internally rotated; 9 cm. actual shortening.

Radiogram.—Shows fair acetabulum. Head small and misshapen, coxa vara, high on ilium. November 17, 1913, patient placed on traction table, ether.

Operation.—Open operation on left hip, anterior route, capsule cut. Acetabulum shallow and full of fibrous tissue. It was possible to project the head of the femur forward from its position on the dorsum of the ilium, but it could be placed in the acetabulum. The cartilage on the surface of the head was elevated and a portion of the superior part of the femoral head was excised, allowing the cartilage to fall back in place over this area. Then by abduction and powerful traction the head was reduced. Condition of patient poor at end of operation, due to shock. December 24, 1914, cast changed, position good, walks well. January 8, 1914, last seen, walks well, 6 cm. short, position stable and weight-bearing, thigh abducted.

Result.—Partial excision of hip. Correction of adduction and extreme shortening from 9 cm. to 6 cm., with thigh abducted, function good.

CASE IV.

Elsie D., aged 10 years. Normal birth at term. Began to walk at 14 months, dragged left foot, and was treated with an ankle brace for six months.

Diagnosis.—Single congenital dislocation of the hip, left.

Physical Examination.—Tall child, musculature rather flabby, shortening 6 cm., actual. Left femoral head on dorsum of ilium.

Radiogram.—Posterior dislocation of left femur.

Treatment.—July 6, 1915, patient placed on traction table, ether. Open operation, anterior route, capsule divided, head of femur resting in new formed acetabulum, which is about 6 cm. above normal acetabulum level. Acetabulum small, but deep. With especially strong traction head was reduced, ether 1 hour 5 minutes. Shock, which appeared immediately after the exertion of traction. July 7, 1915, patient in poor shape, has complete anesthesia of thigh and leg on operated side. August 13, 1915, radiogram shows hip reduced, sensation impaired in operated thigh and leg. November 11, 1915, neurological examination shows traumatic injury to peripheral nerve supply somewhere between knee and lumbar plexus. Patient put on daily electrical stimulation and massage. December 20, 1916, patient has regained practically entire power to move her leg and foot, and has regained sensation entirely in her affected side. She walks well, hip has marked limitation of motion.

Note.—During convalescence this patient fell and fractured her left femur above the knee on the affected side. This was treated in plaster and united well, and has given no trouble since.

Result.—Anatomic replacement, fair function. Sustained peripheral nerve injury, which gradually cleared up, due to pull on sciatic nerve.

CASE V.

George G., aged 7 years. Family and past history negative. Limp noticed at two years, associated with injury.

Diagnosis.—Single congenital dislocation of the hip, right.

Physical Examination.—Marked lumbar lordosis. Right thigh held in 15

degrees flexion and adduction, drops on that side. Trochanter higher and posterior. Actual shortening 1 inch. General muscular condition above normal.

Radiogram.—Head of femur posterior and above, shallow acetabulum.

Treatment.—March 3, 1916, attempt at manipulative reduction failed. March 17, 1916, placed on traction table, ether. Open operation, anterior route, capsule divided. Acetabulum shallow, located with difficulty. After section of the capsule bands and psoas tendon, head was reduced into socket easily, well maintained. No complications, postoperative course smooth. November 16, 1916, good reposition, hip normal function, no limp, lumbar lordosis gone. Measurements show $\frac{1}{2}$ inch actual lengthening on affected side.

CASE VI.

Ruth R., aged $8\frac{1}{2}$ years. Normal birth. Family history negative. Past history, mother claims to have noticed something peculiar at right hip when child was a few days old. Walked at two years.

Diagnosis.—Congenital dislocation of hip, right.

Physical Examination.—Muscular development above normal for age. Right lower extremity, $4\frac{1}{2}$ cm. short. Trochanter prominent and high.

Treatment.—May 11, 1916, patient placed on traction table, ether. Open operation, anterior route, capsule divided. Acetabulum shallow, full of fibrous tissue. Head of femur 4 cm. above acetabulum. By traction and internal rotation, head was reduced, although acetabulum is small, head fits into it snugly. Had considerable shock from operation, which developed during traction manipulation. Good recovery, no complications. September 6, 1916, radiogram shows head well in acetabulum. October 31, 1916, cast changed, motion allowed in all directions. Measurements, right lower extremity $\frac{1}{4}$ inch shorter than left. December 1, 1916, good function, perfect reposition.

Result.—Perfect reduction, good function, no complications, wore cast for five months after operation.

CASE VII.

Otto Z., aged 10 years. Family and past history negative. Noticed limp when child began to walk at 17 months.

Diagnosis.—Congenital dislocation of hip, left.

Physical Examination, W. D. and N.—Muscles good. Actual shortening 4.5 cm. on left.

Radiogram.—Head of femur on dorsum of ilium.

Treatment.—July 12, 1916, placed on traction table. Anterior route, capsule dividend anterior, bands cut, very thick. After marked traction, abduction and rotation, with some injury to surface of head, head was reduced into well-formed acetabulum. Marked shock, associated with traction efforts. Had anesthesia of dorsum of foot for eight days. August 26, 1916, radiogram shows head reduced. October 27, 1916, walks well, cast removed. January 3, 1917, has had active and passive motion and massage. Walks well, hip is stiff, but allows some passive motion in all directions. Radiogram shows good reduction.

Result.—Perfect replacement, good stability, hip still limited in motion. Wore cast four months after operation.

CASE VIII.

Mary R., aged $9\frac{1}{2}$ years. Family history negative, full term, no complications. Limped on beginning to walk.

Diagnosis.—Congenital dislocation of hip, left.

Physical Examination.—Muscles in good condition. Walks with drop on left. Head of femur high on dorsum; 4 cm. shortening, actual.

Treatment.—June 14, 1915, manual attempt at reduction failed. July 8, 1915, second attempt failed, manipulation. October 5, 1916, patient placed on traction table, ether. Open operation, anterior route, capsule divided. Head discovered embedded on dorsum of ilium, dug out with great difficulty and brought forward. With extreme traction, head was pulled down and pushed over into a deep acetabulum, where it was retained with remarkable security. Patient developed alarming symptoms of shock and operation was hurriedly ended. Time, 1 hour 10 minutes, ether. October 6, 1916, patient has loss of sensation below knee and cannot move foot. Is in poor shape. October 20, 1916, has peripheral nerve injury, which is gradually clearing up. January 10, 1917, hip retained. Patient bears body weight on affected side, cast renewed. January 8, 1916, wore cast three months after operation.

CASE IX.

Hilda V., aged 9½ years. Family history unimportant. Past history noticed limp when child began to walk, which has grown worse as child grew older; right side being noticeably weaker than the left.

Diagnosis.—Single congenital dislocation of the hip, right.

Physical Examination.—Well-developed and well-nourished girl, actual shortening 2 inches. Radiogram shows well developed head and fair acetabulum.

Operation.—May 16, 1914, open reduction, patient placed on traction table, ether. Hip exposed by anterior route. Psoas and anterior capsule divided. After considerable difficulty, head was replaced in acetabulum. Following operation there was an infection of the operative field, which involved the hip articulation and which required drainage tubes. This condition gradually cleared up, and child was allowed up and about with plaster of paris spica, high shoe, and crutches. November 1, 1914, plaster spica removed, child walks well, but hip is stiff. February, 1915, hip is abducted and allows very little motion in any direction.

Result.—Reduction with abducted stiff hip.

CASE X.

Lucy A., aged 25 years. Family and past history unimportant. Peculiarity was noted in gait when child began to walk at about 2 years of age. She now has difficulty in walking any distance because of slipping of hip.

Diagnosis.—Single congenital dislocation of hip.

Physical Examination.—Shows rather stout, well-developed female, 2½ inches actual shortening. Head considerably worn away, acetabulum of good depth and with good margins.

Operation.—Open operation May 19, 1914, patient placed on traction table, open operation, anterior route. Hip capsule exposed and divided, psoas muscle cut. Head found to be very high and posterior on the dorsum of the ilium. With considerable traction it was impossible to reduce this head into the acetabulum, but it could be forced anterior, and anterior transposition was accomplished, and the wound was closed with the thigh abducted to 50 degrees. Plaster spica applied, good reduction. Patient discharged from hospital six weeks after operation, using crutches and wearing plaster of paris spica. Returned five months after operation, plaster of paris spica renewed. May 1, 1915, patient walks well with hip abducted. Hip has become firmer and bears body weight.

Result.—Anterior transposition with good function in motion and weight bearing.

DISCUSSION ON THE RESULT IN THE GROUP OF CASES IN WHICH THE OPEN OPERATION WAS DONE.

The results obtained and the difficulties in gaining them clearly illustrate the statement made several times earlier in this paper that the difficulties in the way of reducing congenitally misplaced hips increase very sharply as the child advances in age with the hip unreduced, and especially is this true in bilateral cases.

In this series we have had twelve hips that have been operated upon seen in ten cases. In one double case we secured an anterior transposition with correction of deformity and improved function. In one double case, after partial excision of the heads of the femora, the extreme lordosis was corrected and function was much improved. In two single cases, one of them 25 years of age, an anterior transposition was secured with marked improvement in function. In two single cases likewise satisfactory reduction was secured, but function was temporarily impaired by injury to the sciatic nerve. In four single cases there was satisfactory reduction and the return of good function. In one single case satisfactory reduction was obtained, but there was an infection which resulted in a stiffened hip. In one single case there was satisfactory reduction, but full range of motion has not returned to the hip after six months.

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EXTRAPELVIC CAUSES OF UTERINE HEMORRHAGE.

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The writer's interest in the constitutional causes of uterine hemorrhage was aroused by the following cases:

CASE I.

Miss T., aged 18, single, schoolgirl. At 13 she had an attack of scarlet fever, which was followed by chronic parenchymatous nephritis. Menstruation began at 15, and was at first regular, although rather profuse. For the past year, however, menstruation had been increasingly profuse and prolonged.

I saw the patient March 14, 1913, in consultation with Dr. William J. Brown. At that time she had been flowing continuously for nineteen days, beginning with a regular menstrual period, and was passing large clots in the form of casts of the vagina and uterine cavity. Ice, ergot, and hot douches had all been tried without effect.

The patient was exceedingly anemic. Blood pressure, 180; urine, normal, acid; specific gravity, 1.026; albumin, very large trace; sugar, 0. Sediment showed numerous casts—hyaline, fine granular and epithelial. Occasional fatty cast. Renal cells and leucocytes. Occasional blood corpuscle.

Under ether, examination of the pelvis showed uterus in normal position, of normal size, but very flabby in tone. Appendages normal. The uterus was curetted of a very small amount of endometrium, and a small gauze pack introduced, which was removed at the end of forty-eight hours. The bleeding ceased immediately, and menstruation did not return during the remaining three months of the patient's life.

The exact mechanism of the hemorrhage in this case is not clear. There was no excess of endometrium. Three possible factors may have contributed—increased blood pressure, anemia, and a flabby uterus. The final control of the hemorrhage must have been due to the effect of the mechanical stimulation of the curettage upon the uterine musculature. The writer has since seen a similar case in which the hemorrhage was controlled by curettage followed by transfusion.

CASE II.

Boston City Hospital record No. 345,705, Mrs. H., 44, married, four children. Menstruation began at 16, regular, twenty-eight day type, six days' duration, always profuse. Beginning with regular menstrual period October 7, 1916, flowed continuously for five weeks. Entered the hospital November 11, being sent in with a diagnosis of malignant disease of the uterus.

Examination on entrance showed the uterus retroverted and slightly enlarged. Profuse flowing, amounting to actual hemorrhage. This patient bled as freely as many cases of miscarriage. General physical examination showed a well-developed and nourished woman, markedly anemic. Heart, soft systolic murmur heard all over precordia. Lungs negative. Abdomen slightly distended. Liver and spleen enlarged.

Blood examination was as follows: white count, 100,400; red corpuscles 1,720,000. Stained specimen—myelocytes, 32 percent; polynuclear neutrophiles, 23 percent; polynuclear eosinophiles, 4 percent; small mononuclears, 30 percent; large mononuclears, 8 percent; normoblasts, 1 percent; megaloblasts, 2 percent. The diagnosis of uterine hemorrhage due to myelogenous leukemia was was therefore made. A hasty curettage under light anesthesia resulted in the removal of a very small amount of endometrium. The uterus was packed, ergot and pituitary extract given. The hemorrhage then ceased, but the patient died from anemia about twenty-four hours later.

Flowing from chronic passive congestion in cardiac conditions is not uncommon. The following case is one of a large group:

CASE III.

Boston City Hospital, Gynecological O. P. D. No. 20,371, Miss C., 16, single. Menstruation began at 15, regular every twenty-eight days, three to four days' duration. Beginning with regular period, patient flowed profusely for two weeks, at the end of which time she applied at the out-patient for treatment. Pelvic examination showed the uterus of normal size, anteflexed, freely movable. Appendages normal. Cardiac area slightly enlarged. Presystolic murmur and thrill, also systolic murmur at apex. Transferred to medical out-patient department, where diagnosis of mitral stenosis and regurgitation was confirmed, and under rest and small doses of digitalis the flowing ceased. Subsequent history unknown.

The not infrequent incidence of cases of uterine hemorrhage from extrapelvic causes led the writer to look up the literature of such conditions. The subject is an important one from the standpoint of both diagnosis and treatment, since it is evident that, without careful general physical examination, many such cases will be incorrectly subjected to local treatment without regard for the underlying cause, or, in any event, failure to arrive at a correct diagnosis will result. From his limited study and observations the writer has evolved the following classification of the extrapelvic causes of uterine hemorrhage. This classification is necessarily somewhat incomplete, but will serve as a working basis for further work on this subject.

Associated with diseases of the blood—*anemia, purpura, leukemia.*

Associated with circulatory disturbances—*cardiac disease, hypertension, portal stasis.*

Associated with disturbances of the organs of internal secretion—thyroid, adrenal, pituitary.

Associated with diseases of metabolism—scurvy, diabetes.

Associated with disturbances of the nervous system.

Uterine hemorrhage associated with diseases of the blood.—Pernicious anemia is mentioned as a cause of uterine hemorrhage by Kelly (*Med. Gynec.*, p. 151). This probably a less common cause than purpura and leukemia. Weil (*Ann. de Méd. et de chir. inf.*, 1912, XVI, 553) reported 9 cases of hemorrhages at the time of puberty without local lesions, probably the result of a form of purpura. In 5 of these patients developmental anomalies, as obesity, hypoplasia, etc., were present. Weil ascribed this condition to some disturbance in the internal secretions. R. C. Cabot (*Osler and McRea*, part IV, pp. 664, 671) found uterine hemorrhage in 3 out of 66 cases of myelogenous leukemia and not at all in 34 cases of lymphatic leukemia, although hemorrhage was a more common symptom of the latter variety. The etiology of the hemorrhages in these conditions is not clearly understood. Wright's theory of a deficiency of calcium salts in the blood is not borne out by the results of treatment with calcium lactate (Cabot, loc. cit.).

Associated with circulatory disturbances.—The mechanism of the uterine hemorrhage in circulatory disorders seems fairly simple. In the chronic passive congestion of cardiac disease the veins of the pelvis are, of course, engorged. The uterus is an organ in which bleeding is periodically a normal condition. It is easy, therefore, for these veins to cast off their excess blood through the normal channels. Why bleeding from the uterus should occur in portal stasis is not equally clear, since the ovarian and hypogastric veins which drain the uterus empty into the vena cava and have no part in the portal circulation.

In arteriosclerosis it is somewhat debatable whether the hemorrhage is due solely to the general increase in vascular tension or to sclerotic changes in the uterus and its own vessels. Anspach (*Tr. Am. Gynec. Soc.*, 1909, XXXIV, p. 800) suggests that it may be due to a relative diminution in the normal amount of elastic tissue.

Associated with disturbances of the organs of internal secretion.—Mackenzie (*Allbut and Rolleston, Sys. of Med.*, IV, part 1, p. 373) noted the occurrence of irregularity of menstruation, amenorrhea, and menorrhagia in exophthalmic goitre.

Salzman (*Am. Jour. Obst.*, 1916, LXXIV, p. 812) reports a case of atrophy of the thyroid in which there was profuse uterine hemorrhage not controlled by curettage, which cleared up under thyroid extract, and mentions several similar cases. According to Salzman the hypertrophy of the thyroid during menstruation and pregnancy would have something to do with ending the period in one case and preventing menstruation in the other.

Dock (Osler and McRae, IV, p. 894) states that myxedema is sometimes accompanied by severe menorrhagia. We know nothing of the exact action of the internal secretion of the thyroid, but we do know that the internal secretions of the thyroid, ovary, and pituitary body are all more or less interdependent. In hypopituitarism, according to Dock (loc. cit., p. 810) the sexual glands lose their function early, so that uterine hemorrhage would be rather rare in pituitary disturbances.

In Addison's disease, Dock (loc. cit., p. 794) says that amenorrhea is the more frequent condition.

Associated with constitutional diseases.—Among the constitutional diseases which have been mentioned as causing uterine hemorrhage are scurvy, diabetes, and the rheumatic diathesis. These must be rather rare causes, as the writer has not met with menorrhagia or metrorrhagia due to either.

Associated with disturbances of the nervous system.—This subject has been discussed in an interesting paper by Ehrenfest (Tr. Am. Gynec. Soc., 1907, XXXII, p. 522). He reported the case of a patient curetted without success six times for continuous flowing following a miscarriage. After nine months of such flowing a vaginal hysterectomy was done. Pathological examination of the uterus showed the endometrium normal, media slightly increased in the larger vessels, elastic tissue well developed, a normal relation of connective tissue to muscle. This paper is carefully written and all organic causes of bleeding ruled out, leaving the hysteria with which the patient did suffer as the only possible cause of hemorrhage. Ehrenfest also reviewed the literature.

From this brief review it will be seen that our knowledge of the extrapelvic causes of uterine hemorrhage is somewhat fragmentary. There is a field for much study along the lines of the mechanism by which bleeding from the uterus is produced. As far, however, as our present knowledge does go, we are justified in drawing some conclusions.

1. All cases of uterine hemorrhage not definitely due to some obvious local cause should be subjected to a very thorough general physical examination before any local treatment is attempted.

2. When some constitutional cause is found, treatment should be directed first to the relief of the general condition.

3. If such constitutional treatment fails to stop the hemorrhage, curettage may be resorted to in order to stimulate by mechanical irritation the uterine muscle to close down on the bleeding vessels, except in patients with high arterial tension, in whom the hemorrhage is usually an attempt on the part of nature to relieve the increased blood pressure, and therefore should not be checked.

THE SOCIAL STATUS OF THE MORPHINE ADDICT.

By C. B. PEARSON, M. D., Arlington, Md.

Our title "doctor" means "teacher," as we all know. There seems to be some confusion in the minds of the profession, as well as in the minds of the laity, as to the social status of the morphine addict. Before we can play our part as teachers, it is necessary that we clarify our own ideas. I use the word morphine because morphinism is the most common form of opiumism. There is no essential difference between the use of morphine and any other form of opium or any of its other derivatives. The laity as well as ourselves are fairly well informed as to how the immoderate use of alcohol effects the social status of the individual. Many good physicians regard morphine addicts as inveterate liars and utterly irresponsible. I have lived in the same building with them now for many years, and I have not found this to be the case.

The drug compels the addict to be secretive. Reader, note the word *compel*. It is important to clearly understand that the addict's secretiveness is not an optional affair, but that it is one of the pathological symptoms of the disease morphinism. The drug causes self-depreciation. This I believe is the primal cause of the secretiveness, and this, in turn, is the cause of the tendency toward prevarication.

Why morphine should almost invariably cause self-depreciation, while alcohol almost as invariably causes the opposite state of mind, is something that I cannot explain. I can only say that they are two different agents and that they affect the mental operations differently.

But to return to the matter of prevarication. In order to understand how this feature of morphinism affects the addict's social status, it is necessary to inquire into its exact nature. Is it on the same plane as prevarication in the normal individual? No. In the one case it has to do with pathology and in the other with morality. At present, on account of the various state laws as well as on account of the Harrison act, there are good prudential reasons why the addict should wish to conceal his addiction. These prudential reasons, plausible as they may appear, have nothing to do with the cause of the addict's tendency toward prevarication. The addicts were just as secretive and just as prone to prevarication years ago before there were any antinarcotic laws in existence. Let me repeat, this *tendency* is *pathological*. Either consciously or unconsciously the addict thinks that he has the right to conceal

his addiction, and I may truthfully say that the majority of them look on it as their duty to do so. We must look for the cause in the peculiar effects of the drug on the brain.

This abnormal mental state that compels the addict to conceal his addiction becomes a fixed mental condition. It is a symptom of morphinism, just as the tendency to obscenity is a symptom of many forms of insanity. I do not mean by this that the addict is insane or mentally irresponsible. A person is said to be insane when his mental operations are so far abnormal that he is unable to conform to the conventions of society in speech or actions.

As I have already said, the addict's prevarication has to do with the concealment of his addiction. If the addict were ever a truthful person, he will, when called upon the witness stand, give trustworthy evidence in all matters not connected with his addiction, and in all the ordinary relations of life he will be found to be truthful, with the exception above mentioned. After many years his memory will be found to be more or less impaired, and he will be found to have less ability to concentrate his attention on what others are saying. From this cause he may make misstatements. These are made with no intention to deceive.

With those who do not have a correct idea of the pathology of morphinism, the addict would be given a lower status as regards truth and veracity than the real facts in the case would warrant. As the years go by, the addict will try to deceive himself in regard to the damage that his addiction has done to him, and I must say that he generally succeeds in doing so. Having already deceived himself in this matter, the fabulous stories that he tells about what he can do, although ridiculous, are not intentionally lies; but even this does not detract from the statement that in all matters not connected with his addiction the addict is generally truthful. So I may say that, properly appraised and understood, this matter of morphine prevarication does not detract very greatly from the addict's value as a citizen.

Is one entitled to a divorce because of morphinism in the wife or husband? In discussing this matter I shall do so from the medical point of view, and not from the legal viewpoint. I do not know what the laws are in regard to the matter, and I do not know the attitude of the courts. I simply wish to throw out a few hints to the physician that may prove useful to him when called on for advice. In most states, I believe, a person cannot secure a divorce on account of the insanity of the other party to the marriage contract, the reason given being that a divorce might interfere with the cure of the afflicted one. The state would naturally be interested in preventing this, because it would mean a permanent burden on the taxpayer that might have been avoided.

I think that we should be justified in holding about the same line

of reasoning in regard to the addict, and with much greater reason in one respect, for the prospects of a cure are much greater for the addicts than is the case with the insane; and I think that I am safe in saying that the worry and trouble of divorce proceedings to one whose nerves are already in bad condition from morphinism would lessen the prospects of a cure. Morphinism is a misfortune and not a fault, and therefore not proper grounds for a divorce. I believe that the proper advice for the physician to give under these circumstances is that the addict seek treatment at the earliest moment. When, however, an addict conceals his or her addiction and marries, he or she is doing the other party a great wrong, and, if we look on divorce as ever being right or justified, I think it would be justified in this case. When the addiction was acquired after marriage, I think that the greatest happiness and the best interests of all parties concerned well served by securing appropriate treatment for the affliction.

Does the mere fact of morphine addiction warrant the appointment of a guardian? Most assuredly no. The same rule that holds good in other cases should hold good here. If the addict is really incompetent to manage his affairs, he needs a guardian and not otherwise. The mere fact of his being an addict is no evidence of incompetency. Many addicts are able to perform their duties fairly well, and some of them are surprisingly well able to care for themselves. I have had patients whose earning capacity was \$7,000 per annum. If an addict is called into court by his friends (?), all the facts in the case should be carefully inquired into. The mere fact that a person uses morphine habitually is not of itself evidence of incompetency.

What is the status of the addict as regards his earning capacity? This varies greatly in different cases. Among the wealthy addicts the capacity to look after business is greatly lessened. This is on account of the tendency to turn night into day, the tendency to cause one to seek seclusion, the tendency to indolence and a lack of ambition generally, and, lastly, the centering of the addict's whole thoughts on dose time.

Among those addicts who have to earn their own living, morphine furnishes a motive to be up and doing that very effectually overcomes the physical effects of the drug. This motive comes from the overpowering desire never to be without the means of procuring the drug. This motive is stronger than the desire for food and drink, stronger than the love of wife or child and all other motives combined that ordinarily incite men to labor. The wealthy, having always at hand the means of obtaining the drug, give way to its bad effects and deteriorate more rapidly than the poor, who many times have to work beyond their strength to procure the drug. Even among the poor there is a tendency to indolence when the

addict is not the breadwinner and depends on others for support. There are also exceptions to the tendency to idleness among the well-to-do. There are numbers of cases where the drug, instead of causing indolence, causes a restlessness that will not permit the addict to be quiet. These addicts are constantly busy, and many of them are able to look after business matters to good advantage. But, taking all cases into account and taking into account the money withdrawn from more useful investments, the whole tendency is to decrease one's ability to procure the material things of life.

Is morphinism a cause of crime? It is not. Crime, however, is a prolific cause of morphinism. Let us suppose that a clergyman and a burglar, both being about the same age and about equal in health and strength, begin the use of morphine at the same time. On account of the tendency of the drug to produce a lack of self-confidence, indolence, a lack of ambition, and a progressive loss of physical and mental strength, we can readily see that the drug will be of no more use to the burglar than to the clergyman. Though both may keep up for many years in spite of the drug, it will gradually cause a decrease of activity in both cases, and in all probability will put both the burglar and clergyman out of business eventually. It has been my observation that when a man who takes an active interest in the religious and moral activities of his community becomes an addict, he gradually ceases these activities, and, when he becomes cured, he usually returns to them. On the other hand, the man of vicious activities gradually ceases these pursuits, but, when cured, returns to his old ways. The trend of morphinism is to lessen activity, whether this activity be good or evil.

I have said that crime was a cause of morphinism. Why is this? The chief of the Baltimore police department stated in a newspaper article that over one-half of the underworld were morphine addicts. To a superficial observer this would seem to be irrefutable evidence that morphinism was a cause of crime. It was said many centuries ago that "the way of the transgressor is hard." The saying is still true. None are so likely to seek oblivion through whisky, cocaine, or morphine as those of the underworld. When we take into account that both whisky and cocaine are more potent causes of morphinism than even painful disease, we can readily see how crime may be a cause of morphinism. Morphinism is not a social vice like alcoholism, generally speaking; but in the underworld, on account of its general prevalence, it becomes so to some extent. Aside from the positive evidence that we have that morphinism does not increase the tendency to criminality, we have the presumptive evidence that it does the reverse through its known effect on the mind and character. There is no greater fear constantly on the addict's mind than the fear that he may be placed in circumstances where he will be separated from his drug supply. While the thought

of being arrested and thrown into jail is not a pleasant thought to anyone, it is a horrible thought to the addict. No one can have a stronger motive than the addict to retain at all times complete freedom of movement and complete control over his drug supply. Any action that would tend to curtail his freedom and thus jeopardize his access to his drug supply would naturally be repugnant to him.

As I have said before, the desire for morphine with the addict is greater than his love of family and friends. This being the case, we can readily see how morphinism would cause one who is not already a criminal to refrain from any action that might end in the curtailment of his liberty. The natural tendency of the drug is to cause the addict to avoid all trouble, independent of any fear that it might have disagreeable consequences. The morphine addict is self-depreciative, not self-assertive like the alcoholic. He likes seclusion, ease, and quiet; and, above all things else, he loves to be let alone; so the whole tendency is always away from crime and not toward it. If he has any other means of procuring the drug (and he usually has), nothing could tempt him to steal. Driven by extremity to steal to get the drug, he might steal, and probably would, because as I have said the drug becomes the supreme object in life. The addict's wits are by no means dull when it comes to devising ways and means of procuring the drug. He will find ways to do this that would not occur to the normal person; so that the necessity of stealing or committing other crimes in order to procure a supply rarely happens.

Is the morphine addict a menace to society? I should not say that he is. The alcoholic may ask you to have a drink. The smoker may ask you to have a cigar. The morphine addict will not ask you to take a hypodermic. He is so secretive that he will not trust anyone with the knowledge that he has the drug is his possession. Most of them will not permit those most intimately associated with them to see them under any circumstances take a dose. The victim of tuberculosis is a far greater menace to society.

Is the addict a criminal because he continues the use of the drug? I should not say that he is. No one can use morphine for even a few weeks without becoming below par both mentally and physically. This means a diseased condition, and one of the most characteristic symptoms of this disease is that the addict cannot discontinue the drug of his own volition. There is no other drug that is followed by even a tithe of the suffering that follows the discontinuance of morphine. There are many habit-producing drugs, but opium stands in a class by itself. The whisky drinker sometimes loses his ability to quit voluntarily, and so does the cocaine user, but the opium user always loses this ability. It is one of the conditions of his disease.

Our lawmakers have tried to put the morphine addict in the criminal class. No law-making body can alter scientific facts. *The morphine addict is an invalid.*

PRIMARY TUBERCULOSIS OF THE INTESTINES.¹

By LEOPOLD FRANKEL, M. D., North Chicago Hospital.

Tuberculosis of the intestines has been studied more since the operation for appendicitis has become so common. It was progressive surgery that taught the medical profession that, in some cases, certain portions of the intestines are primarily affected by tuberculosis and that gratifying results were obtained by surgical intervention. Tuberculosis of the intestines, while a common complication of pulmonary tuberculosis, is not frequently found as a primary affection. Primary tuberculosis of the intestines is caused by the ingestion of contaminated food, such as milk or meat.

Klebs and Leube have denied the occurrence of primary tuberculosis of the intestines, but Bollinger, Melchior, Wyss, and others have verified this fact as a result of an enormous clinical experience and thousands of autopsies. Tuberculosis of the esophagus, stomach, and duodenum is a very rare condition, occurring usually, only in connection with similar affection of other organs, and the knowledge of it is rather a result of necropsies than of clinical findings. Tuberculous ulcers of the stomach are found mostly in children, and present no characteristic clinical symptoms. The most frequent seat of tuberculous ulcers is the terminal ileum and cecum. The predilection for this part of the intestine may be explained by anatomical and physiological facts. It is commonly known that the glandular appendages of the mucous membrane—the lymph follicles and Peyer glands, which play an important role in the colonization of bacilli, like typhoid and tuberculosis—are most numerous in the lower portion of the ileum.

Another predisposing cause for the selection of the ileocecal region is the slowing down of the movement of the chyme, tending to stagnation, which causes irritation of the mucous membrane and prolonged retention of the bacilli, which have thus all the conditions necessary for their development. The chemical composition of the intestinal contents also favors the predilection for the ileocecal region, where the contents begin to be alkaline. It seems that an alkaline reaction favors the development of the tubercle bacilli, which fact would explain to some extent the rarity of tuberculous lesions in the stomach with normal gastric juice—i. e., free hydrochloric acid. Achylia gastrica or hypoacidity, in fact any pathological condition which diminishes the digestive power of the stomach, will favor the development of tuberculous lesions.

¹This article is complementary to the paper on "Intestinal Tuberculosis" by Drs. Frankel and Eisen, published in the January issue of this journal.

Tuberculosis of the intestines is found most frequently in children and young adults. All statistics show the rarity of intestinal tuberculosis in the first year of life, the frequency of the disease, gradually increasing until the fourth and fifth years and then diminishes again. This term coincides with the average time of weaning and change from mother's milk to the diet, through which contaminated food has an opportunity to invade the intestinal canal.

SYMPTOMS.

Tuberculosis of the intestines may run its course from beginning to end without any symptoms indicating a diseased condition of the intestinal canal. It is not probable that the initial deposit of tubercles causes any noticeable disturbance. It seems that the tuberculous condition must advance to the stage of ulceration before the patient becomes conscious of any bowel trouble. Necropsies often reveal tuberculous ulcers of the intestines without there having been during life the slightest evidence of their existence.

That a solitary tuberculous ulcer of the intestine may exist without causing any symptoms before perforation occurs is shown by case I. Two distinct forms may be observed associated with different symptoms—1, fibrous form; 2, ulcerous form. Why a given intestinal ulcer in one case undergoes a rapid necrotic process, while another takes a slow hyperplastic course, may be explained by the presence or absence of associated pathogenic microorganisms, such as the staphylococcus pyogenes aureus and the streptococcus.

The symptoms of intestinal tuberculosis will vary according to the extent and the seat of the lesion, and it is, therefore advisable to classify them accordingly: (1) diffuse ulcerous tuberculosis of the intestines, (2) isolated, hyperplastic ileocecal tuberculosis, and of (3) tuberculosis of the rectum. In diffuse ulcerous tuberculosis of the intestines we have two leading symptoms—(1) diarrhea, (2) abdominal pain—though neither symptom is pathognomonic of intestinal tuberculosis, but the combination is often suggestive and helpful as a guide to the correct diagnosis.

Nothing is more difficult than to distinguish between various causes of diarrhea occurring during the early period of life. Neither the color nor the consistence of the stool presents anything characteristic, except that the presence of strings of mucus streaked with blood may suggest ulceration. Colicky pain referred to the umbilicus, tenderness on deep pressure, progressive emaciation, some rise of temperature, obstinate persistence of diarrhea which does not yield to any kind of medication—these are points justifying a suspicion that the disease may be tuberculous. Palpation of the abdomen and vaginal and rectal examination for the detection of enlarged mesenteric glands should not be neglected. The most convincing evidence of the tuberculous nature of the affection is the

presence of tubercle bacilli in the feces, providing we can exclude with absolute certainty the possibility of the bacilli originating from swallowed sputum. It is advisable to look for tubercle bacilli in isolated streaks of mucus. Valuable diagnostic aid can be obtained by the employment of tuberculin injection. Local reaction and general toxic symptoms will suggest the nature of the disease. In cases of primary diffuse tuberculosis of the intestines an early correct diagnosis is seldom made.

In this connection cases II and IV possess peculiar interest, for the findings in vivo in each instance leave no doubt that the case was really one of primary intestinal tuberculosis, which had not been diagnosed before operation.

Ileocecal tuberculosis.—Durante in 1890 called our attention to the striking similarity between carcinoma of the cecum and hyperplastic tuberculosis of the cecum. Most of the cases of hyperplastic ileocecal tuberculosis were mistaken for carcinoma, and even now every experienced surgeon will be confronted with the difficulty of differentiation between ileocecal tuberculosis and carcinoma. Unfortunately the symptoms, both local and general, may be absolutely identical in both cases, and the diagnosis can be made only by exploration or sometimes only by the pathologist. The chronic course of the disease will explain the fact that a large tumor, causing obstructive symptoms, is already present when the patient calls for our assistance. Sudden onset of intermittent pain in the ileocecal region, radiating to the umbilicus, associated with vomiting, will be the complaint of the patient, while the physician finds a tumor of which the patient was entirely unaware. The diagnostician has to think of many possibilities, which are: (1) appendicitis with infiltration; (2) periappendicular abscess; (3) psoas abscess; (4) ileocecal tuberculosis; (5) neoplasm; (6) actinomycosis; (7) intussusception.

Ileocecal tuberculosis has no characteristic symptoms by means of which it can be recognized with certainty. In some cases the following may be of assistance:

1. In ileocecal tuberculosis we palpate the thickened, enlarged, infiltrated terminal ileum and cecum, which has retained its original shape, while in carcinoma a mass presents itself changing the cecum to an irregular tumor.

2. Ileocecal tuberculous tumor shows diffuse, gradually diminishing ends, while carcinoma shows abrupt, sharp edges.

3. Ileocecal tuberculosis shows slow progress, while carcinoma grows fast and soon reaches the stage of stenosis.

4. Tubercle bacilli in stool or a positive tuberculin reaction will be of assistance in some doubtful cases.

The careful interpretation of the above-mentioned tests is essential because, in case of a hidden tubercular focus causing no

symptoms, a positive laboratory test might influence our judgment and divert our attention from the true nature of the swelling in the cecum, which might not be tubercular. I refer here to case III.

Tuberculosis of the rectum presents itself most commonly as necrosis and ulceration; rarely does it appear under the form of infiltration and stenosis. The ulcers frequently lead to periproctitic abscesses and fistulas. The ulcerous form of rectal tuberculosis, which is generally associated with some other focus in the intestines, changes the entire clinical picture of the disease merely through the appearance of the tenesmus, which is the chief symptom of the complicating proctitis. Frequent motions, accompanied with pain and tenesmus, small stools which contain membranes of purulent and bloody mucus, are the outstanding features. Besides the finding of tubercle bacilli in feces, or, as it is recommended, in the mucus taken from above the sphincter ani, we have valuable diagnostic aid in the proctoscope.

In conclusion, if by this contribution of my experiences I have succeeded in calling your attention to conditions which are so easily overlooked, I feel that I have accomplished the purpose of my paper.

CASE I.

D. G., laborer, aged 41. Was in perfect health, doing his usual work, lifted a heavy railroad rail; experienced immediately a very sharp pain in the abdomen and nearly fainted. After his removal to the North Chicago Hospital, Dr. Carl Beck performed a laparotomy and found a perforated ulcer of about $\frac{1}{4}$ inch in diameter in the middle portion of the ileum, with peritonitis. The ulcer was closed and an enterostomy was performed, which was closed at a secondary operation. Patient made an uneventful recovery.

CASE II.

F. D., aged 28. Family history negative. Past history negative, except at 23 a history of "typhoid" fever, with intestinal hemorrhages. No hemoptysis nor cough; did not notice any fever or night sweats, was never jaundiced, appetite good, bowel movement regular, did not lose weight. Present complaint, constant *dull pain* in ileocecal region, uninfluenced by change of position, defecation, rest, and diet. Does not radiate. Examination shows a fairly well-nourished man, no adenopathy. At 4 p. m. temperature normal, pulse 78, lungs normal, no evidence of latent or manifest tuberculosis. Liver not enlarged, tenderness in the region of the gall bladder. No tumor was found in the abdomen, though pressure at the ileocecal region caused sharp pain, which radiates to the umbilicus. Slight leucocytosis, with normal differential count. Stool has normal color, odor, and consistency. After three days' meat-free diet, no blood was found in the stool. Urine normal. Diagnosis of sub-acute appendicitis was made, with the possibility of gall bladder affection, and at the operation by Dr. Carl Beck the following was found: Laparotomy. Ascending colon, hepatic flexure, and transverse colon were matted together and bound down with stout adhesions to the cecum. Many enlarged glands and tubercles were found throughout the mesentery. Three months later the patient gradually developed tuberculous enteritis, with the following symptoms: pain, diarrhea, with mucus, rise of temperature in the afternoon, slow emaciation. This was complicated with ulcers above the sphincter ani, and a typical

picture of ulcerous proctitis presented itself. Mucus taken from these ulcers contained tubercle bacilli.

CASE III.

S. E., after being operated for duodenal ulcer in another hospital, came to North Chicago Hospital with indefinite pain in the left side of the chest and abdomen. Lungs were normal. The only positive findings were tubercle bacilli in the mucus of the stool. Probable diagnosis of tuberculous ulcer in the intestine was made, which was not verified by Dr. Carl Beck at the operation, which shows that we may have tubercle bacilli in the stools without having a tuberculous lesion of the intestine.



Fig. 1.

CASE IV.

Miss B. D., aged 24, clerk. Entered the North Chicago Hospital December 1, 1914, with the following complaint: For the past nine days has had severe pain in the epigastric region ten minutes after eating. The pain radiates to the back and lasts forty minutes. No vomiting. Family history negative. Patient had no cough, no hemoptysis, no night sweats, no fever. Menstruated two weeks ago, had not menstruated previously for seven weeks. Three weeks ago had constant desire to urinate, with burning and itching. At the present has no urinary disturbances. Appetite poor. Intervals of diarrhea and constipation. Examination shows a poorly developed, fairly well-

nourished individual. Temperature, 100°; adenopathy. Heart and lungs normal. Slight tenderness in the epigastrium, constant dull aching in the region of the appendix, does not radiate and is not relieved by thermic applications or pressure. Urine normal, blood picture shows a leucocytosis of 13,000; small leucocytes, 18 percent; large leucocytes, 21 percent; polymorphonuclears, 58 percent; eosinophiles, 2 percent; myelocytes, 3 percent; trans., 3 percent. Wassermann test was negative. Diagnosis of appendicitis was made and at the operation, December 5, 1914, the following was found: Terminal ileum, cecum and 8 inches of the ascending colon indurated and filled with tubercles; many ulcers on the mucosa; lumen in some places almost occluded; sections sustained the operative diagnosis. See picture of the specimen.

This case was unusually interesting on account of the negative clinical lung findings, while the intestinal symptoms of pain in the right lower quadrant, intermittent constipation and diarrhea, and evening rise of temperature should have aroused suspicion of intestinal tuberculosis without a tuberculin test and the detection of tubercle bacilli in the stool.

Case V is very instructive for the diagnosis of intestinal tuberculosis, although it was not primary, there being a healed focus in one apex. It shows the variability of complaints made by patients suffering from intestinal tuberculosis. Dyspeptic symptoms are often complained of, making the impression that the patient is suffering from some gastric trouble. The regular occurrence of pain at a certain time after taking of food easily diverts the physician from the true nature of the disease.

CASE V.

M. P., aged 28. Family history negative, past history negative as to tuberculosis. Is complaining of constant pain in the stomach, increased by ingestion of food, has lost 25 pounds the last three to four years. Positive findings: Dullness on percussion of left supraclavicular and infraclavicular region, inspiration above same region normal, expiration prolonged and loud, but no rales. Temperature normal; enlarged inguinal glands. Stomach analysis showed absence of free hydrochloric acid. Feces did not contain blood, but tubercle bacilli. Preoperative diagnosis, probable intestinal tuberculosis. At the operation by Dr. Carl Beck this was confirmed by the finding of one enlarged retroperitoneal caseating tuberculous gland, which was removed for section. The case was therefore at a very early stage.

THE AFTER-CARE OF INFANTILE PARALYSIS CASES— THE WORK OF THE NEW YORK COMMITTEE.

BY DONALD E. BAXTER, DIRECTOR.

Coincident with the epidemic of infantile paralysis which prevailed throughout Greater New York during the summer of 1916 was the universal recognition, both by the medical profession and the laity, that the urgent necessity for the proper coordination of all available forces for efficient after-care work was of primary importance.

In consequence a series of conferences called by Dr. Haven Emerson, commissioner of health, resulted ultimately in the inception and organization of the New York Committee on After-care of Infantile Paralysis Cases, composed of some several hundred persons representing the medical profession, the hospitals and dispensaries, the nursing associations, the charities, and the general body of citizens.

In reducing to a working basis the multiplicity of demands and duties inherent in such organization, the Central Committee, through its various subcommittees, has laid special emphasis on three distinct features of the work, viz.:

1. The coordination of all efforts in the way of treatment, home care, and training of the children left paralyzed by this epidemic, the proper distribution of patients among the various agencies, and a complete follow-up system to insure that none was being neglected. To this end the city was districted for nursing purposes and dispensary attendance, a comprehensive system of records was inaugurated, and the entire oversight of all these children planned through the various cooperating agencies.

The plans suggested by the committee met with a most cordial response on the part of the hospitals and dispensaries throughout the entire city, every effort being made by them to accommodate their services to the unparalleled demands so unexpectedly made on them for their constant and unremitting care.

2. The concentration of the several existing transportation funds into one central fund—this to be also augmented in every possible way so that all children in need of special dispensary transportation might have it, and without delay. A committee on transportation was accordingly appointed, which speedily accomplished both the concentration and augmentation of these several funds, some \$12,000 in money and a number of motor buses and motor cars being thus provided for the transportation of the children.

3. The third major undertaking of the committee was an attempt to raise the sum of \$250,000 to assist in providing the proper treatment, home care, and training for these afflicted children.

The various agencies in these fields having exhausted their available resources, the committee evolved the plan of making in their behalf one federated appeal for funds. In furtherance of this plan, a subcommittee was appointed having for its chairman Dr. S. S. Goldwater, former health commissioner of the city of New York. In due time the various conferences of this subcommittee were productive of a series of resolutions which were submitted to the After-care Committee, being unanimously approved and adopted by them. The preamble and resolutions follow:

RESOLUTIONS OFFERED BY DR. S. S. GOLDWATER AND ADOPTED BY THE GENERAL COMMITTEE AT A MEETING HELD OCTOBER 30, 1916.

Whereas, The New York Committee on After-care of Infantile Paralysis Cases has been organized to promulgate and maintain adequate cooperation between all agencies concerned in the after-care of infantile paralysis—this in order to secure a higher degree of efficiency and to avoid duplication of effort—therefore be it

Resolved, that the New York Committee on After-care of Infantile Paralysis Cases request the Associated Out-patient Clinics to indorse certain proposed measures herein set forth, as follows:

1. Resolved, that the Committee on After-care express its willingness to undertake the raising of the proposed fund and to assume responsibility for its adequate distribution.

2. Resolved, that participating agencies shall be requested to signify their willingness to receive money from the central fund and to refrain from issuing special appeals for this purpose prior to January 1, 1917.

3. Resolved, that the Executive Committee shall be authorized to issue the proposed appeal for funds on behalf of the Committee on After-care whenever in its opinion a sufficient number of the agencies included in the preliminary list as suitable participants shall have expressed their approval of the plan and shall have signified their willingness to refrain from making special appeals within the period named.

4. Resolved, that no part of the central or common fund shall be used by the Committee on After-care for the expenses of its own administration, but the fund shall be expended entirely through the various cooperating agencies.

5. Resolved, that the Executive Committee be authorized to prepare a list of agencies which, by reason of the work which they have done or are doing now, are those through which the money to be raised should primarily be expended; and that, in the distribution of the proposed fund, existing agencies doing work of an approved character shall be first considered, but a reserve shall be provided for the use of new or additional agencies whose cooperation may be needed and invited from time to time; that the committee shall not encourage the entrance of any additional agencies into the field, except to meet definite needs.

6. Resolved, that each participating agency shall be requested to make due acknowledgment in its annual report of money received from the central fund.

7. Resolved, that the Executive Committee shall be authorized to determine how many units of work may properly be undertaken by each agency at the expense of the fund.

8. Resolved, that the participating agencies shall include institutions for medical relief, those furnishing means of necessary transportation, agencies engaged in home care, and those engaged in fitting crippled children, so far as possible, for a normal social life.

9. Resolved, that the Executive Committee shall appoint a finance committee, whose function it shall be to consider and pass on all appropriations recommended by the Executive Committee.

10. Resolved, that the Executive Committee shall be authorized to appoint an advisory council.

11. Resolved, that all hospitals and clinics participating in the fund shall be required to conform to the standards of equipment and organization which may be acceptable to the Executive Committee.

Whereas, the Associated Out-patient Clinics of this city has been generally recognized as the most authoritative body in matters pertaining to the administration and efficiency of dispensaries and out-patient departments of hospitals,

Therefore be it resolved, that this New York Committee on After-care of Infantile Paralysis Cases request the Associated Out-patient Clinics to undertake the grading and supervising of the Poliomyelitis clinics of the several institutions of this city engaged in after-care work on the basis of standards formulated by the Public Health Committee of the New York Academy of Medicine; such standardization, grading, and supervision to serve as a guide to the New York Committee on after-care of Infantile Paralysis Cases in the disbursement of funds among the approved clinics.

Be it further resolved, that the Committee on After-care of Infantile Paralysis Cases request the Associated Out-Patient Clinics to circularize their membership, indorsing the present work of aforesaid committee and also the proposed measures as outlined herein.

To date the larger part of this \$250,000 fund has been raised, with excellent prospects of final and complete success. None of this money will be used for the administrative purposes of the committee, this having been provided for by a generous contribution from the Rockefeller Foundation.

In connection with the appeal for funds a request was received from the Committee on Public Health of the New York Academy of Medicine to the effect that aid along the lines suggested should be rendered to only those dispensaries which would maintain approved standards of after-care. This Committee on Public Health—comprising L. Emmett Holt, M. D.; Virgil P. Gibney, M. D.; and Charles L. Dana, M. D.—defined the following standards of personnel and equipment which should properly be found in such dispensaries, and, on request of the After-care Committee, the Associated Outpatient Clinics agreed to certify the existence or non-existence of these standards in any given dispensary:

A DESIRABLE STANDARD FOR A CLINIC GIVING AFTER-CARE TREATMENT
TO POLIOMYELITIS CASES.

For a three-hour clinic (assuming that the mothers assist in dressing, rubbing, etc.).

PERSONAL EQUIPMENT.

2 orthopedists; 1 neurologist; 1 electrotherapist; 1 nurse; 3 masseurs and instructors in muscle training; 1 record clerk; 2 visiting nurses for treatment and observation; 1 bracemaker (mechanic).

The lay members of this staff (nine) may be used in two institutions, giving four hours to each, one having a morning and the other an afternoon session.

MATERIAL EQUIPMENT.

Suitable waiting and dressing rooms. Suitable examining and treatment rooms, containing tables for giving massage, electrotherapy, instructions in muscle reeducation, etc. Electric apparatus (transmitting faradic, galvanic, and sinusoidal currents). Testing and measuring apparatus. Filing cabinets. Facilities for warm baths, x-ray examination, use of Zander apparatus, furnishing braces, and consultation with pediatricist and surgeon.

The city of New York itself has done much in the way of alleviation of these poliomyelitis victims, the Department of Health having during the epidemic appropriated to their needs some \$300,000. Its authority and responsibility, however, ceased when they left quarantine, but, notwithstanding this fact, every possible assistance has been rendered the After-care Committee by Dr. Emerson, commissioner of health, even to the transfer to the committee of the large Brace Fund raised by him during the summer. The Department of Public Charities has also been of great help to the committee in many and various ways.

Public interest in this after-care work continues unabated, and many voluntary offers of both money and service from all classes of society are being constantly received. The need is, however, great, and in like measure, great should be the response.

The committee, to sum it up conclusively, is really doing a most notable work under the efficient guidance of Dr. Thomas J. Riley as chairman and under the immediate supervision of Dr. Donald E. Baxter as director, whose services have been loaned to the committee through the courtesy of *The Modern Hospital*.

AFTER-CARE TREATMENT OF INFANTILE PARALYSIS.

By HERMAN C. FRAUENTHAL, E. E., M. D., New York City,
Chief of Clinic to the Hospital for Deformities and Joint Diseases.

During the epidemic of infantile paralysis in the summer of 1916 over 10,000 cases survived with more or less paralysis. This will give some idea of the amount of work falling on the committee of the after-care of such cases. Some idea may also be gleaned from the fact that at the Hospital for Deformities and Joint Diseases we have treated over 300 cases in a single day.

Every case applying for treatment is very carefully and thoroughly examined by the physician in attendance to determine the muscles paralyzed or paretic. A very complete history is then taken of the acute illness, both from the mother and from histories brought by the patient or parent from the hospital in which he was isolated. These statistics are later tabulated, so that the age, muscles involved, etc., may be listed, and thereby some conclusion may be drawn later as to the amount of recovery, etc.

The mother of the patient then receives detailed instructions as to the hygienic care of the child, the proper application of the brace, if one is applied, the necessity of keeping the paralyzed limb protected by additional clothing, and the method to be used in educating the child to the use of its paralyzed limb. This is facilitated by placing the child in a warm salt water bath, saturated sufficiently so as to buoy the child up, allowing freer use of movements.

The institutional treatment after the foregoing is to take the reaction of degeneration of all the muscles in the body, tabulating the paralyzed ones. More will be said of reaction of degeneration later. The child is now placed in an electric light bath so as to influence the vasomotor paresis and warm the parts for better electrical conduction in the treatment which follows. This heating of the part may be done by the dithermic high-frequency currents.

The next course of treatment is massage for from five to twenty minutes, depending on the number of muscles involved. I wish to emphasize that the origin and insertion of the paralyzed muscles are always approximated or relaxed, so as not to put any strain on them during any manipulation.

The child now enters the electrical room, where it is treated by one of the following forms of electricity: interrupted galvanic, faradic, sinusoidal, and combined currents.

From this department it is referred to the gymnasium school, where it is taught the nature of such movements as flexion, ex-

tension, external rotation, internal rotation, abduction, adduction, etc. These movements are first thoroughly inculcated in the child's mind, associated with a healthy group of muscles, and then followed by an effort to induce the child to reproduce the movements in the paralyzed member.

If the child appears at the hospital with a brace, a special examination is made to determine whether the brace is still necessary for the purpose for which it was applied; if not, it is removed. Braces are applied during the convalescent stage to prevent a deformity; later they are used to prevent a deformity or to allow support for walking; also to prevent strain of the paralyzed muscles, as a strained muscle takes longer to recover its tone.

At the time of the present epidemic much stress was brought to bear on the attending physicians on the subject of prevention of deformities, and much good work was done along these lines. In examining the cases, however, which have come under observation at this institution we find that, while measures were taken to prevent the deformity of drop foot, still very little attention was paid to other joints in the body, so that many cases were allowed to become deformed at the knee, hip, back, shoulder, etc. It is, therefore, necessary later to correct these deformities, which oftentimes can be accomplished only with great difficulty.

The method of taking the reaction of degeneration may be found in any text-book on the subject, or in my recent article on infantile paralysis appearing in the *New York Medical Journal*, September 30, 1916. Many fallacies are found in many of the cases. The great value of the test is in making a relative prognosis of a muscle's ability to regenerate. A negative reaction may occur and the muscle may recover its complete tone. A muscle normal in reaction may eventually grow no stronger, while a paretic one (not paralyzed) may surpass it eventually in strength. Only a relative idea of the condition of the muscle can be formed, the cause of the error being the relative excitability of the patient at the time of the examination, the temperature of the part, etc.

A child whose attention is detracted by candy, a toy, or some other playful method will give quite a different reaction than when over-excited or in a temper. The method used at this institution is to get the child in as good a frame of mind as possible, raise the body temperature of the part to be examined to normal or to 100 degrees, have the sponges thoroughly moistened with saline; have the large sponge always in the same relative positions, and take notes of the voltage, amperage, and their product milliwatts for future reference.

For general information and for the benefit of those who have occasion to take care of cases of this type, I wish to state with emphasis that the most important factors in the treatment of these

cases is to allow no stress or strain upon any paralyzed muscle, and to use every available method of preventing deformity, even though the child is confined to bed for a long period of time. The most serious deformities to correct are flexion at the thigh, with stretching of the internal rotators, causing flexion and external rotation of the thigh; at the shoulder, paralysis of the deltoid, with contractions of the antagonistic muscles, the latissimus dorsi. The correction of the deformities at the ankle, knee, and back are much more easily accomplished, but there is no good reason for their occurrence if preventive methods were used during the acute and subacute periods.

As to the amount of time devoted to each treatment, I may say that baking with white light is given only long enough to bring the part to a proper temperature; massage, from five to twenty minutes; electrical currents, from three to six minutes; and the educational exercises about fifteen minutes; thus, in all, a patient gets about thirty minutes' treatment three days a week. Some of the older children are sent to the Zander department to use Zander apparatus to exercise their muscles.

These children are treated for three to four years before any major operations are performed, and only necessary minor operations are done during the clinical time to correct deformities. The major operations consist mostly of transplantation of muscle tendons, in which a healthy antagonistic muscle or a healthy coordinate muscle is used to take the place of a paralyzed one. Bone operations have also been done occasionally, such as astragalectomies, etc.

In conclusion, I wish to repeat the following order of treatment: 1, white light heat; 2, warm massage; 3, electricity; 4, educational exercises before a mirror; 5, braces, if indicated; 6, proper instructions to parent for home care of the child. I would suggest that this course of treatment be carried on three days a week, and to avoid fatiguing the muscles.

THE SURGICAL ASPECTS OF KIDNEY DISEASE.¹

By MILES F. PORTER, M. D., F. A. C. S., Fort Wayne, Ind.

In contemplating a surgical attack upon a patient, no more important question presents itself to the surgeon than the condition of the kidneys. When the contemplated attack is to be made upon some part of the urinary apparatus, the question is of even greater moment than when the attack is to be made upon some other part of the body. This is true whether the attack is to be made upon the kidney itself or upon some other part of the urinary apparatus. The explanation lies in the fact that reflex anuria is particularly prone to follow operations upon the urinary organs. Given a prospective surgical case in which impairment of kidney function is known to exist, the surgeon must determine (1) the degree of impairment and (2) the character of the impairment. Concerning the degree of impairment, it should be remembered that man has four to five times as much kidney tissue as he needs for ordinary purposes. Experience has demonstrated that quite marked impairment of the kidney function is not incompatible with a reasonable degree of safety in surgical procedures. In all operations of expediency too much care and caution cannot be used. I am, however, convinced that in the past we have insisted, to the detriment of patients, on too near an approach, on the part of the kidneys, to normal function. Whether a given degree of impairment of function should positively forbid surgical operation will depend on (1) the character of impairment and (2) the operation necessary. Indeed, a slight operation may be necessary to determine the nature of the impairment. It will be seen, therefore, that the nature of the lesion is almost, if not quite, as important to the surgeon as its degree, and that the determination of its nature presents even a more fascinating question for solution than does the determination of its degree.

For this study we may divide the disturbances of renal function into (1) those due to structural changes, (2) those due to inhibition, toxic or reflex, and (3) those due to a combination of these conditions. Structural changes in the kidney may be permanent or temporary, unilateral or bilateral, and may originate from diseases of the urinary apparatus itself or from disease of other organs. Those cases of kidney disturbance arising from diseases of the urinary tract may be due to disease of the kidney itself (intrinsic)

¹Read by invitation before the Kalamazoo Academy of Medicine, November 14, 1916.

or to causes outside of the kidney (extrinsic). In the writer's experience the most common causes of disturbances of renal function are, first, obstructive lesions of the bladder (especially enlarged prostate) and urethra, and, second, obstruction of the bile ducts. Indeed, the most frequent cause of death after operation for obstruction of the bile passages has been, in my experience, uremia. An infection of one kidney not infrequently causes a diminution of function in its healthy mate, which diminution entirely disappears after nephrectomy or nephrotomy. Beer¹ reports a case of prostatectomy for adenoma of the prostate complicated by pyelonephrosis in one kidney. Following the operation an exacerbation of the trouble in the diseased kidney reduced the phenolsulphonphthalein output to a mere trace, but indigocarmine appeared in eleven minutes from the healthy kidney. From the diseased kidney only pus was obtained, but from the healthy kidney clear urine. Removal of the diseased kidney was successfully done, and in three weeks after the operation the phenolsulphonphthalein output was normal. Occasionally one finds both kidneys diseased structurally, and yet each functionates less well than it would were it not for the toxic influence arising from its mate (as, for instance, in double calculus pyelonephrosis). In such cases surgery may demand an operation upon one kidney, usually the poorest one, even though the function is much below the level of safety, in the hope that the relief from the toxic and reflex influence thus caused may bring the kidney function up to or above the safety level. Acute infections occurring in patients suffering from structural kidney changes may cause a sudden fall in the kidney function to a dangerous degree, as shown by the usual tests. Such patients should be given the benefit of needed surgery notwithstanding the suppression of function, provided one is warranted in believing that the cause of the suppression can thus be removed. Thus relieved, these patients may live long in comfort with their damaged kidneys. Permanent catheterization or a simple cystotomy or cholecystotomy under local anesthesia will frequently cause a rapid return of kidney function to the line of safety, when a curative operation may be done without undue risk.

My experience convinces me also that patients suffering with less acute infections will oftentimes perish if the necessary operation is postponed until fair kidney function is obtained. I have successfully done thyroidectomy, gastroenterostomy, and prostatectomy with a phenolsulphonphthalein output of 30 percent or less in two hours in cases wherein a careful study led to the conclusion that the kidney function was being strongly inhibited by conditions that these surgical procedures would remove or ameliorate.

On the other hand, there is a group of cases in which sym-

¹Ann. Surg., Oct., 1916, p. 447.

metrical permanent changes in the kidney have reduced the function to nearly zero, and in which all preliminary treatment proves futile. In this group of cases the slightest operation may prove fatal, even cystoscopy. The wise surgeon will, of course, not operate where these conditions obtain. However, as noted above, the diminution of function may be due to other causes than permanent structural changes, and it may be possible to remove these causes by surgery and surgery only. One may determine quite easily whether both kidneys are equally disturbed, but it is often impossible to determine whether the disturbance is entirely or partially permanent, or entirely or partially remediable. Hence it follows that one's duty will occasionally demand that he undertake operative relief even though such undertaking is fraught with the gravest danger to the life of the patient, because, on the other hand, his sole hope lies in this direction. In illustration, a patient suffering with obstruction from an enlarged prostate is brought in. The phenolsulphonphthalein output is nearly nil. There is pus in the urine and the uremic symptoms are pronounced. What should be done? Cystoscopy? No. Catheterization of the ureters? No. Put in a permanent catheter. Institute the usual treatment looking toward excitation of the kidney function, and, if no improvement is manifest in a reasonable time, do a cystotomy under local anesthesia, and later prostatectomy may be done or not, owing to the degree of permanent kidney impairment that seems present. The best thing for a patient suffering with cholemia and uremia due to common duct obstruction is prompt drainage of the liver by the way of the gall bladder under local anesthesia. Errors are unavoidable, but we should err on the side of safety to the patient rather than on the side of safety to ourselves. All agree that a little knowledge is a dangerous thing, but as surgeons we ought also to know that a little more knowledge is more dangerous, and avoid efforts to satisfy scientific curiosity at the expense of the patient's safety. Another illustration—a patient comes in with obstructive jaundice, pronounced symptoms of cholemia and uremia. In such a case the best interests of the patient demand an immediate drainage of the bile ducts. No time should be wasted by attempts to arrive at definite conclusions concerning the nature and extent of the kidney disturbance. Without in any way detracting from the great value to the surgeon of the facts to be gained by a thorough study of the kidneys, the writer wants to assert with emphasis that in certain cases—relatively rare, to be sure—the best interests of the patient forbid these inquiries and that in certain others in which these inquiries have been made and in which the findings point strongly to the verdict, no operation, the best interests of the patient demand that this verdict be set aside by the supreme court of surgery—the clinical judgment of the surgeon—and that the operation be

done without delay. It goes without saying that operations on these patients in extremis will usually be palliative rather than curative, and that the operative burden laid upon them must be the lightest possible. To this end local anesthesia must often supplant general anesthesia, or be used in connection with it with a view to reducing the amount of the general anesthesia to the minimum. I have had too little experience with gas oxygen anesthesia to warrant me in expressing an opinion as to its relative advantages in the class of cases under discussion, but it would seem from the reports from other clinics that it is safer in certain cases than ether. Particular care must be given to secure prompt and complete hemostasis as a rule. In certain of these cases, however, venesection, followed by or coincident with intravenous transfusion of normal saline solution, will prove a life-saving measure.

While the title of this paper does not include traumatic injuries to the kidneys, there are two observations in connection with these injuries that are quite germane, and to which I would like to call attention. First, most cases of injury to the kidney in which the trauma is slight occur in children or in young adults. This suggests that there may exist in many of these cases congenital abnormalities of the urinary apparatus or abdominal viscera. Some years ago I nephrectomized a boy who suffered an extensive rupture of a polycystic kidney from a blow of moderate force from a bicycle handle, which struck him on the abdomen just below the tenth rib. Such cases suggest the advisability of the surgeon being on the lookout for abnormalities in the uninjured kidney or elsewhere in the abdomen, especially in the young, in patients suffering from rupture of the kidney as the result of slight trauma. It is perhaps of interest to remark in this connection that the patient above referred to is still enjoying perfect health, and that this case, therefore, seems to be an exception to the rule that polycystic kidneys are bilateral and that nephrectomy of a polycystic kidney should not be done. Second, the experiments of Falcone, referred to by H. G. Bugbee¹ in his recent paper on Traumatic Injuries of the Kidney and Ureter, seemed to show that crushing of one kidney causes permanent disfunction in its fellow. These experiments were made on dogs, and while, as Falcone says, a strict clinical application to men is not possible, yet they would seem to point strongly to the advisability of removing the badly lacerated or crushed kidney promptly when a lesion of the uninjured kidney is suspected. In other words, these experiments seem to show that, in a given case of laceration or crushing injury to one kidney, the demonstration of subnormal function in its fellow would be an argument in favor of the immediate removal of the injured one. The writer quite

¹Ann. Surg., Oct., 1916, p. 464.

agrees with Bugbee, who says that these observations are worthy of further study.

CONCLUSIONS.

1. While kidney insufficiency should often bar surgical interference, especially in operations of expediency, on the other hand it may be an additional argument in favor of operative interference.

2. The final decision for or against operation should be based on the clinical judgment of the surgeon as applied to the case in hand.

3. In these bad risks the surgeon's aim should be relief rather than cure, and the operative burden put upon the patient should be the lightest possible.

THE RELATIONS BETWEEN THE RECTUM AND THE FEMALE GENITALIA—FROM THE VIEWPOINT OF THE GYNECOLOGIST.¹

By GRANDISON D. ROYSTON, M. D.,

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The relations between the rectum and the female genitalia possess great interest for the gynecologist who would view his patients from other angles than through a vaginal speculum. The methods of rectal examination remained but little changed from the time of Hippocrates until some twenty-six years ago, when the rectoscope came into use. Pelvic symptoms often persist in women despite well carried out procedures upon the genitals. The source of trouble in such patients may be in the gastrointestinal tract, without the adnexa or a displaced uterus having given rise to symptoms.

The most important portion of the intestinal tract to the gynecologist is the rectum. The majority of gynecological patients are victims of constipation, often due to sedentary life, to diet, to habit, and, at times, to uterine displacements, tumors, and inflammatory conditions in the pelvis. Such an intimate association of pelvic structures gives a more rational basis for diagnosis and treatment of pelvic symptoms than was available in the cases of mental diseases in young women whose cure, at one time, was thought to demand a double oophorectomy.

It was my good fortune to have enjoyed the personal instruction of Foges, the leading exponent on rectal diseases of women. His rectoscope possessing the advantages of simplicity, of safety, and of a large field of vision, can be used in operating or giving treatments under the guidance of the eye. The examination is best conducted with the rectum free of feces. Where the patient has an ordinary daily bowel movement, no preparation is necessary. In constipated individuals give an enema four to five hours before the examination, lest the remains of the enema or fecal matter interfere. Diarrheic patients should be given some opium after the last evacuation.

All rectal examinations are to be preceded by a digital examination per rectum and a bimanual examination for the detection of tumor masses, strictures, irregularities, and indurations, and for guidance as to the direction in which to carry the tube, etc. After the introduction of the latter past the sphincters, advance

¹Read before the Section on Obstetrics and Gynecology of the St. Louis Medical Society, September 21, 1915.

it only under the direction of the eye. The right lateral prone position, with the hips elevated upon a cushion, is the position of choice for the patient. In certain cases the knee-chest or knee-elbow position is used, especially in sigmoidoscopy. Anemic, cachectic individuals, with extensive inflammatory involvement of the rectal or intestinal wall, are dangerous risks for rectoscopic examination. The smaller the calibre of the tube, the greater the danger. The tube 23 millimeters diameter is suitable for any case after the first year of life.

After the introduction of the tube tip past the sphincters, remove the plunger and inflate, thus unfolding the walls, so that all surfaces may be inspected while inflating. Observe the mucous membrane as to mobility and note any increasing pallor, which may be due to an externally placed tumor making pressure. An edematous mucous membrane, due to an adjacent tumor or cellulitis, whose surface shows no especial changes, may be either not at all or *very* slightly movable. Peritoneal adhesions and tumors can both obstruct the passage of the tube. Be exceedingly careful in excising pieces of tissue for examination because of the great danger of perforation, especially high up.

Among the conditions often met in the gynecological patient are:

1. PROCTITIS.—This may be acute or chronic, and due to various causes, such as infections from amebæ and various bacteria, mechanical and chemical irritants, such as impacted feces, etc. The chief etiological factor of concern to the gynecologist is gonorrhea. In the acute gonorrheal infection of the rectum (gonorrheal proctitis) the rectoscope picture reveals a finely granular velvet-like surface, more or less covered with a yellowish-white pus containing gonococci; the involvement is usually limited to the lower 5 or 6 centimeters, above which the mucous membrane appears yellow. In the chronic form the sphincter mucous membrane appears markedly swollen and in part covered by a purulent discharge mixed with blood; the remainder of the ampulla is diffusely swollen and covered with point-like erosions, from which a profuse light yellow secretion may be wiped. The surface bleeds easily and induration is not present. This form of proctitis must be differentiated from those forms of proctitis caused by foreign bodies, scybalous masses, pelvic tumors, uterine displacements, ulcers, etc. The bacteriologic examination is the best means of making this diagnosis.

2. ULCERS OF THE RECTUM.—These may cause considerable trouble, especially where the infection extends through the muscular coat and produces a periproctitis; the latter may also arise from a perineal furuncle, an infected vaginal operation, puerperal infections, pelvic cellulitis, etc. In periproctitis, suppuration may easily occur and become quite extensive in the ischiorectal fossa, whence the abscess may discharge into the rectum, vagina, perineum, or in any other direction, producing various fistulæ. Ulcer of the rectum is quite frequent, and is often the result of chronic pressure from hard fecal masses; it may also result from proctitis, whether due to dysentery, gonorrhea, syphilis, or tuberculosis. Ulcers are occasionally due to trauma of the mucous membrane from an enema tip. In cases of persistent obstinate pruritis vulvæ, without apparent cause, look for a rectal ulcer as the primary trouble. The diagnosis of ulcer is made with the rectoscope.

3. **FISTULAE.**—These are usually the result of trauma from operative procedures, proctitis of syphilitic, tuberculous, gonorrheal or dysenteric origin, or follow an ulcer, the result of an injury.

4. **STRICTURE OF THE RECTUM.**—This is sometimes the result of extensive healed ulcers, or of pressure by pelvic exudates, or tumors, but is most frequently due to tertiary syphilis.

5. **HEMORRHOIDS.**—These occur in about one-third of all pregnancies. They are varicose or angiomatous dilatations of the hemorrhoidal veins at the anus. They are caused by anything obstructing the general circulation—sedentary life, chronic constipation, pregnancy and labor, being powerful etiological factors.

6. **PROLAPSE OF THE RECTUM.**—This condition is rare in adults; when present, it is usually associated with marasmus, severe labors, persistent constipation, etc. It is directly due to a relaxation of the sphincters and the entire supporting apparatus of the rectum; the relaxation including the levators and the pelvic fascia. When present late in life, it usually accompanies prolapse of the genitalia.

7. **RECTAL TUMORS.**—Are practically limited to polypi and carcinomata, all other tumors being rarities. Polypi of the rectum are sometimes called adenomata; they vary in size from that of a pea to an orange; their cause is not known. Where they are very numerous, the condition is called polyposis. They should be examined microscopically for carcinoma.

8. **CARCINOMA.**—No case of malignant disease in the pelvis can be measured from the standpoint of operability until a rectoscopic as well as a cystoscopic examination has been done. The palpation of the rectum reveals induration; the rectoscopic examination shows an *indurated area which bleeds easily*. In villous carcinoma, prominent, white, nodular growths may be seen swaying on rectal inflation; a piece of the suspicious tissue should be clipped or wiped off and examined microscopically.

9. **SIGMOIDITIS.**—Is practically as frequent as inflammatory involvement of the appendix and cecum. It is most common in childhood. The symptoms are the same as those occurring in appendicitis, except for being on the left side. The causes are the same as those producing proctitis—viz.: infections from amebæ and various bacteria, mechanical and chemical irritants, inflammatory conditions in the parametrium and adnexa, impacted feces, etc. Symptoms may be limited to pain on the left side and distinct tenderness on pressure. Of great gynecological importance is the fact that the sigmoiditis often involves not alone the mucous membrane and muscle wall, but also the peritoneum and mesosigmoid, and from there extends to the pelvic peritoneum and connective tissue, thus producing adhesions to neighboring organs, the pain thus caused being all too often diagnosed oophoritis. When conservative measures as heat, baths, douches, local treatments, diet, etc., do no good, operative separation of the adhesions is the only thing of value.

The mobile or atonic cecum described by Wilms¹ may occupy the pelvis and be palpated bimanually through the vagina, in which case other signs of infantilism and general enteroptosis should be present. Inflammatory involvement of the adnexa may result from an appendicitis and vice versa. Constipation is exceedingly common in women. At times it first arises during pregnancy and the puerperium. Since this pernicious habit is productive of so many ills, it is important for the physician treating women to avoid constipation as much as possible, and in this endeavor I wish to emphasize the advantages of the physical culture of the puerperium.

¹Wilms: Das Coecum Mobile als Ursache mancher Fälle von sogenannter chronischer Appendicitis. Deutsch. med. Wchnschr., 1908, XXXIV, 1756-1758.

CORRESPONDENCE.

Is There a Military Surgery?

To the Editor of the INTERSTATE MEDICAL JOURNAL:

I have read with interest Dr. Warbasse's article in the last issue of the INTERSTATE MEDICAL JOURNAL, and, having been "through the mill" myself, would like to add a word of comment. First, I am in thorough accord with the Doctor in his protest against militarism when applied to the surgeon. It is true that "clothes do not make the man;" neither does a gaudy uniform and shoulder straps and galloons on the sleeves constitute the proper credentials in a man called on to minister to the wounded in battle. But I am inclined to believe that there is such a thing as military surgery just as much as there is a genitourinary surgery, or abdominal surgery, or cranial surgery.

As Dr. Warbasse quite properly says, "surgery is surgery," and, while the same general principles underlying all surgery apply equally to any particular kind of surgery, the question resolves itself into one of familiarity with the work in hand. The Doctor states that "the surgeon who is most competent to heal the wounds of peaceful men is most competent to heal the wounds of men who . . . have themselves become wounded." I much prefer to accept the amended statement in your comment on the article in which you say "the surgeon who is most competent to heal the wounds of peaceful men is also the one who most rapidly becomes competent to treat the wounds of war time."

It would seem hardly fair to expect the surgeon who for years has found his work in appendectomies, gall bladder operations, hernias, enucleations of prostates, with an occasional bit of plastic work on the female perineum, to be suddenly transported to a field hospital and to expect him to cope successfully with the work in his new capacity. From the peaceful pastures of private practice he finds himself projected into a life of din and noise, of mangled, groaning, and dying humanity. Something has to be done for these men, and it has to be done quickly. As the writer has frequently seen, the difference between life and death, success and failure is the difference between speed and the lack of it. The ability of the surgeon to size up the situation quickly and accurately, and to decide what to do, how much to do, and how little to do, and to do it without the unnecessary loss of a moment, is the great desideratum in a man doing military surgery. All this can be acquired, but I hold that the knowledge and judgment which make for success in this work come from actual contact with the work and not from experience obtained in other lines of surgery. The surgeon removed from civil practice and placed in a military hospital is for a time at a disadvantage, not because he is called on to deal with a new surgery, but rather with new phases of surgery. To this he must adapt himself, and, if he be a competent man, he will soon master the work in his new field.

To take up another point in Dr. Warbasse's article. He says that gunshot wounds have become obsolete. My experience runs somewhat counter to this. True, artillery has been the great weapon in this war, but the modern reduced caliber bullet, with a velocity of 2,500 feet per second, has accounted for the deaths of untold thousands. And what of the hordes who fell before the withering fire of the Belgian machine guns before Liege, or the French machine guns at Verdun, for the machine gun is nothing more than a glorified form of rifle?

Furthermore, shrapnel has been used to a large extent, especially in the

early days of the war. The form of injury produced by this missile approaches rather closely that of the minié ball of our own Civil War. A casual perusal of the case records of almost any of the foreign hospitals today will show that the gunshot wounds are still with us, and in a rather more aggravated form than before. The same genius that produced the 42-centimeter howitzer is also responsible for the cupronickel steel bullet capable of producing death at 5,000 yards.

One other remark of Dr. Warbasse's which I cannot quite accept. He says that stab wounds are rarely seen by the surgeon, because "they are usually inflicted upon a helpless or prostrate man, who gives his last gasp far from the surgeon's care!" I think this statement a bit drastic. While I heard of a few isolated cases in which this had occurred, I am quite sure it is not the rule, and does not supply the reason for the scarcity of bayonet wounds. This form of wound, the result of hand-to-hand combat, is not seen because close fighting has not been prominent in this war. Modern trench warfare, while a highly efficient and scientific way of conducting a war, necessarily produces conditions whereby certain picturesque features of former wars are no longer applicable, or they have a limited applicability. The bayonet charge, and the cavalry charge, pictures of which still produce a thrill in the breast of the beholder, have both been conspicuous by their absence in the present war.

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Doctors and Dietetics.

To the Editor of the INTERSTATE MEDICAL JOURNAL:

One cannot keep in touch with current literature without reading at least one article, and usually there are several, each month bearing on the importance of one's diet. The point of view varies according to the nature of the periodical and the phase of the subject in which the author is most interested; but practically all of them voice the opinion that the same intelligence should be given to the business of keeping ourselves fit for living as is shown in any other business in which we may be engaged. One of the prime factors of this business is the selection and preparation of our food.

In the December, 1916, number of the *Scientific Monthly* is an article by Miss Minnie Denton, of the Ohio State University, on "The Desire of Food in Man," which should be of interest to everyone. In the January, 1917, number of *The Modern Hospital*, Albert Warren Ferris, M. D., of Saratoga Springs, N. Y., has an article on "The Prime Importance of Diet," which applies more specifically to hospitals and sanitariums; Dr. Elliott Joslin, of Boston, read a paper before the American Hospital Association, which met in Philadelphia last, on "The Hospital Dietary." These and many other recent contributions emphasize the necessity for having people in charge of our kitchens who know food values, food composition, dietetics, and physiology of digestion.

Gradually, but persistently, is a demand coming from superintendents of both larger and smaller hospitals for a "woman with training and executive ability" to supervise the preparation of food in their main kitchen, as well as to supervise the preparation of special orders in the diet kitchen. In response to this demand, women are beginning to fit themselves for this work. They are completing the four-year college course, then taking special courses or doing post-graduate work in the same way that medical students are fitting themselves for their profession. They are going out well equipped and enthusiastic to help in this special branch of medical work—to meet with what sort of reception in the hospital world?

As stated above, many hospital superintendents and superintendents of training schools are realizing the need for this kind of work; there are many others who do not. Many competent, progressive medical men are asking for a woman with this broader training to be put in charge of the dietetic department of their hospitals, in order that they, through the close cooperation which this affords, may give their patients not only better treatment, but instructions which will be of value to them in their homes. Hospital and medical men with this tendency are as yet, however, in the minority.

It is not necessary for me to mention here the attitude—which is pretty general in hospitals—toward the “layman” or “nonprofessional,” no matter in what capacity he enters the hospital life. The dietitian comes in this class. She may have the support of the superintendent or the superintendent of the training school, or both, yet she can accomplish little without the aid of the medical men. In order to treat a patient intelligently, she must know the diagnosis; should know something of the personality, habits, age, and previous environment of the patient, and she should know the results of the laboratory tests from day to day. In how few instances is this possible!

It is not necessary for me to say what is so universally conceded—that very few physicians have any knowledge of foods or dietetics. The physician's word is law on the wards; he may give any kind of an order that suits his fancy at the time, and it must be carried out. The dietitian may spend her time, energy, and patience trying to teach the nurses food values, food composition, what foods are not desirable under given conditions, proper methods of cooking food materials for given conditions of the digestive organs, etc., only to have all her efforts counteracted by orders from the physicians who know nothing of dietetics, and she is utterly helpless in the matter.

Unless the superintendent insists on some system or uniformity—and frequently when a system is established it is disregarded by some members of the staff—conflicting orders are given by different physicians, so that it is positively futile to try to successfully teach nurses the principles of dietetics or any scientific theories of metabolism.

So much for the effects on the training of the nurse who will later be expected to know all these things when she goes out on her own responsibility. But how about the effect on the patient? In the name of charity we will not reveal all we know about that; but we know, and probably every reader of this article knows, of most disastrous effects, and many of them from which patients have had to suffer.

Since the “Allen treatment” of diabetes has been so widely adopted (and adapted), there have been some wonderful versions of it come to our notice—so recently that the memory is still rankling is one which will serve as an illustration: A patient was brought to our attention whose physicians, after a diagnosis of diabetes was given, put him on a starvation treatment without even getting a urine analysis. Their knowledge of the Allen treatment seems to have been limited to a vague idea that starvation formed a part of it. The patient was a working man, with a family to support, and, after starving four days, was unable to work—and the physicians did not know what to do next. This is an extreme case, I admit. It is not an unusual thing, however, to get an order from a ward man which it is humanly impossible to fill, and, if it were possible to fill the order, it would be impossible to get a patient to eat the meal.

To be sure, there are dietitians accepting positions in hospitals who are not competent to fill an order, no matter how accurately it is given. There are many dietitians who are not so thoroughly fitted for scientific dietetic work as the women mentioned above, but state and national associations are already active, and other organizations are being formed which are trying to overcome this.

Are the medical men going to help?

A HOSPITAL DIETITIAN.

DIAGNOSTIC AND THERAPEUTIC NOTES.

THE TYPHOIDIN TEST.—Gay (*Jour. Lab. and Clin. Med.*, Jan., 1917). There seems little reason further to doubt that the skin sensitiveness to preparations of the typhoid bacillus (typhoidin) described by Gay and Force in typhoid vaccinated individuals and in typhoid recoveries is, to a large extent, specific. Question, however, may still exist as to the technic of the test itself and as to the interpretation of the results obtained, and this communication deals with a group of 154 nurses and physicians studied from these standpoints. The technic used was that introduced by Force and Stevens, which is briefly as follows: first, the use of a polyvalent preparation from several chosen strains of typhoid bacilli to allow for the probable varieties and corresponding antigenic differences in typhoid bacilli; second, the employment of a carefully determined minimal effective dose of the dried polyvalent typhoidin (0.00002 gm. in 0.05 c.cm. of 0.5 percent. carbolated saline); third, the injection of this dose intradermically; and finally the reading of the reaction in forty-eight instead of twenty-four hours. This later period tends to eliminate the nonspecific irritative reaction which may occur in normal individuals from the protein of the culture medium or the phenol employed as a diluent. The criterion of a positive reaction consists in the presence after forty-eight hours of a definite indurated papule plus a reddish areola of at least 5 millimeters.

A survey of the percentage of positive results shows that 75 percent of those individuals that had recovered from typhoid gave a positive reaction. From 75 percent to 40 percent of those that had been vaccinated against typhoid also reacted positively, and in general in decreasing correspondence with the lapse of time since immunization. Something over 14 percent of presumably normal individuals also gave a positive reaction—whether this is due to some peculiar nonspecific susceptibility of the skin, or whether they have at some time undergone an unsuspected typhoid infection, or indeed whether they are unrecognized typhoid carriers. In the author's opinion a positive reaction indicates that the individual is more or less perfectly protected against typhoid fever. He points out, in the first place, that no individual in whom a positive reaction has been obtained has acquired typhoid fever. In the second place, individuals who react positively, when reinoculated with typhoid vaccine, react much more violently than do individuals who give a negative typhoidin test. And, finally, individuals who have been vaccinated against typhoid and who react negatively become positive in most instances on further immunization.

SINGERS' TONSILS.—Voorhees (*New York Med. Jour.*, Dec. 16, 1916). In order to settle the vexed question as to the permissibility of tonsillectomy in singers, in view of the fear lest the operation injure the singing voice, the author circulated a questionnaire among 500 physicians and 500 singing teachers. The replies were fairly well in agreement, and indicated that the operation itself, if skillfully performed, does not injure the voice. Bad results are most often due to cicatricial contraction, resulting from careless dissection or from neglected after-treatment. Occasionally loss of the singing voice after tonsillectomy appears to be due to a nerve injury, but this complication is probably rare.

TREATMENT OF PERITONEAL ADHESIONS.—Vogel (Zentrabl. f. Chir., 1916, No. 37; abstr. *Cor.-Bl. f. Schweiz. Aerzte*, 1917, No. 1). The operative removal of peritoneal adhesions is one of the most thankless tasks in surgery. Recurrences, often worse than before operation, are the rule, so that many surgeons refuse to operate in such cases. A variety of substances have been introduced into the peritoneal cavity with the object of preventing the reformation of such adhesions, but as yet no satisfactory material has been found. After many failures, the author believes he has hit on a mixture that promises well. It consists in a solution of sodium citrate, to prevent the formation of fibrin, in mucilage, which coats the raw peritoneal surfaces until they can be overgrown with endothelium. His formula is:

Sod. chlorid.	1.8
Sod. citrat.	0.5
Sol. gummi arab.	ad 200.0

This mixture is sterilized and poured into the peritoneal cavity with a tablespoon after the adhesions have been cut. It is distributed as thoroughly as possible, whereupon the wound is closed.

In the two cases in which the method was tried the author's results were remarkably good. Both cases were grave, with intestinal obstruction due to peritoneal adhesions, and both came to operation three times. The first two operations brought no relief; the third, laparotomy, in which the above-mentioned mixture was used, was completely successful. All discomforts ceased and spontaneous daily bowel evacuations set in.

A RAPID METHOD FOR THE DIAGNOSIS OF RENAL TUBERCULOSIS.—Morton (Jour. Exper. Med., Oct., 1916, XXIV, p. 419). The value of guinea pig inoculation in the diagnosis of renal tuberculosis is generally recognized. The disadvantage of the method lies in the very considerable interval that must ordinarily elapse between inoculation and death of the animal. A number of methods have been suggested for shortening this interval, such as crushing the inguinal glands just before inoculation or injecting tuberculin into the inoculated guinea pig. At the Massachusetts General Hospital, Morton has worked out still another method which may prove of value. He finds that it is possible to reduce the resistance of guinea pigs to tuberculosis by x-ray exposures, so that, when animal inoculation is required for a diagnosis, a much quicker result may be had than by the use of normal animals. In renal tuberculosis, when it is necessary to resort to the use of animals, one must ordinarily wait from five to seven weeks, while by the use of x-rayed guinea pigs the diagnosis can be made in from eight to ten days. The resistance can be sufficiently lowered by one massive dose of x-ray, administered either shortly before or after the inoculation of the material to be tested. The lesions are so marked in these animals that the diagnosis is certain after the interval indicated above.

HEMATEMESIS DUE TO CHRONIC APPENDICITIS.—Outland and Clendening (Am. Jour. Med. Sc., 1917, No. 2). Gastric hemorrhage in appendicitis has been described by Moynihan, La Rogne, and several other authors, and, since attention has been directed to it, has been found by many surgeons of experience. The case reported by the authors was a farmer 50 years old. For years he had complained of constipation and sour stomach, with eructations of acid material. On several occasions he had vomited small quantities of blood. When he presented himself for operation, his prominent symptom was epigastric pain and recurrent vomiting. Two weeks before, he had vomited a

pint of dark-red blood two times. A test-meal showed hyperacidity and occult blood.

At operation the stomach was found entirely normal, except that the serosa around the pylorus was reddened and mottled with small veins like a drunkard's cheek. The appendix, on the other hand, was found buried in a dense mass of adhesions, from which it was removed with difficulty; in its mesentery were found several lymphatic glands, the size of peas. Microscopically the appendix showed an obliterating fibrosis.

The gastric hemorrhage was doubtless due to seepage from the inflamed and congested mucosa. The symptoms that suggested ulcer may have been the reaction of the stomach to the continuous stream of toxic material passing upward from the appendix.

The authors ask whether it may not be possible that "many cases of gastric or duodenal ulcer have their origin in a chronic appendix, that the ulcer may be the site of a septic embolus which has traveled along the omentum from a diseased appendix." Moynihan, in recent articles, states that in all of his later operations for gastric or duodenal ulcer he examines the appendix and finds it diseased in the vast majority of cases.

BOOK REVIEWS.

THE OPERATING ROOM. A PRIMER FOR PUPIL NURSES. By Amy Armour Smith, E. N., formerly superintendent of New Rochelle Hospital, New York; Superintendent of Nurses at the S. R. Smith Infirmary, Staten Island, and at the Woman's Hospital of the State of New York. Philadelphia: W. B. Saunders Company. 1916. Price, \$1.50.

One is often confronted with the task of either organizing or recasting the operating room service of a hospital. Under such circumstances he will find this little brochure by Amy Smith of almost inestimable value. In twenty-two chapters there is a wealth of detail that has been selected and arranged with an intelligent selection that cannot be commended too highly, even though some of the subjects discussed do not have an actual bearing on surgical operative technique.

A TEXT-BOOK OF PATHOLOGY. By W. G. MacCallum, Professor of Pathology in the College of Physicians and Surgeons, Columbia University, New York. With 575 illustrations, chiefly from drawings by Alfred Feinberg. Philadelphia and London: W. B. Saunders Company. 1916. Price, \$7.50.

A new manner of presenting old and shopworn goods always brings relief, and so a glance at the table of contents of MacCallum's Textbook of Pathology startles us and stimulates us by its novelty. We find no chapter on Inflammation, nor on Retrogressive Changes, nor on Progressive Changes; we find no "Second Part" devoted to Special Pathology. But we find a book which represents a unity in development—a development based on either Injury or Disturbance.

In this book there seems to be evinced an effort to place the pedagogics of Pathology on a sound basis of logical thought, an effort to teach the student not by the older didactic method of presenting to him simply descriptions, but by showing as far as possible the development of lesions as a result of injury. Cause and effect are brought into relationship, and general physiology is considered primarily while introducing the description of pathological lesions as examples of results.

As far as concerns the material and matters considered in this book, we find very much the same ground has been covered as in the usual text-book of pathology of the past. After all, the fundamentals and scope of pathology are the same, no matter from what viewpoint we may approach the subject. But it is just in the approach to his subject that MacCallum has left the beaten path. He has stressed the pathological physiology of conditions and has drawn into his consideration the mechanics and the chemistry of disease. He has appreciated that the preliminary education required of the medical student can be of value to and should be put to use by the student. He has used the earlier education of the medical student as the starting point of his book, and he wastes neither time nor energy in presentation of fundamentals. In his preface he tells us that this book represents largely the course as given by him at the College of Physicians and Surgeons, Columbia University, and it is evident that he expects the student to be, as he should be, capable of reasoning.

With all this praise of the independent and modern construction of MacCallum's book, it might be suggested that the consideration of pathological histology and anatomy had possibly been neglected, but this is not the case.

The matter considered in this volume is much the same as we would find in any of the older books. The author apologizes for having possibly left out a consideration of some pathological conditions which are of importance; a few such omissions can be noted, but the same can probably be said of most text-books; furthermore, it seems more important to instill the habit of logical thought than to cram and cramp with facts and data which are but presented as so many unrelated entities.

The author is also rather needlessly apologetic for a tendency to introduce symptoms—needlessly, we believe, since on morbid anatomy is built clinical medicine and its guide, symptomatology. Since MacCallum has written with the idea of showing the relation between cause and effect in regard to the development of lesions, it seems but natural that he should show further the effect of the lesions on the processes of the living organism.

In MacCallum's theoretical considerations there is possibly some evidence of a certain provinciality of emphasis. While it may be somewhat unjust to criticise theoretical presentations as they appear in a text-book, where they must perforce be rather limited, it does appear that the author has chosen the theories which he emphasizes largely from those originating in a somewhat limited geographical area. There seems to be lacking a cosmopolitan viewpoint in this regard.

One feature of the book which is of special merit is the presentation in one illustration of sections of several tissues showing contrasts or differences; it is remarkable how impressive these differences become when shown in this manner. The illustrations throughout the book accomplish well the purpose for which they were inserted, giving a clear idea of the gross or histological picture of the lesions.

THE BASIS OF SYMPTOMS. *The Principles of Clinical Pathology.* By Ludolph Krehl, Ordinary Professor and Director of the Medical Clinic in Heidelberg. Authorized Translation from the Seventh German Edition by Arthur Frederic Beifeld, Ph. B., M. D., Instructor in Medicine, Northwestern University Medical School, Chicago. With an introduction by A. W. Hewlett, M. D. professor of internal medicine, University of Michigan, Ann Arbor. Third American edition. Philadelphia: J. B. Lippincott Company. 1916. Price, \$5.

The long-encuring popularity which Krehl's "Pathologische Pathologie" has enjoyed in Germany is easily explained by a perusal of the present English translation. It is rare that a translation compares favorably with the original either in style or content, but the present volume is a notable exception. One of the faults of Dr. Krehl's original work is its incompleteness, for either through disinclination or oversight the author fails to make reference, except in rare instances, to any literature except the German. This fault has been corrected in the English translation, and there is frequent reference to English and French literature both in the text and bibliography. Pathology is more and more concerned with altered function rather than with altered structure, and Krehl rendered a great service by calling attention so forcibly to this trend and placing the knowledge so gained before the clinician in a practical usable form. The present translation is as much "up to date" as our rapidly advancing medical science will permit, and, as before mentioned, is more international in its scope than the original.

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EDITORIAL.

VICTORY BEFORE PEACE.

It is a commonplace of military history that, in all wars, disease has killed more combatants than have fallen in battle. During the Transvaal War the British army lost in killed and dead of wounds a comparatively insignificant number of its effectives, while the victims of disease were five times as numerous. In the Spanish-American War of 1898 this disproportion was much greater. These wars may be said to have closed the epoch in which preventive medicine was relatively neglected by the medical organization of armies, and its ministers obstructed and frowned on by the military authorities.

The year 1898 saw low watermark in the matter of preventive medicine—at any rate as regards results. But the tide turned almost immediately, and in the Russo-Japanese War preventive medicine made a good showing in the armies of the Island Kingdom. For the first time in the history of great wars, the number of men killed in battle or dying of wounds was considerably in excess of those who were the victims of disease.

This was the arrival of military preventive medicine. In the present war this branch of applied science has achieved astounding success. The British commander on the western front, Sir Douglas Haig, in a recent report has said: "There has been an almost complete absence of wastage due to diseases of preventable nature." The same is true of all of the army fronts in western and north-western Europe. That conditions were not so favorable in the Balkans and in Mesopotamia was due to the special conditions of the armies in those parts and, in particular, to political pressure having led to their somewhat premature expedition. From these fronts also, as conditions have righted themselves, favorable reports are coming in. The information from the Central Powers is more fragmentary, but we have every reason to believe that the

results obtained, especially in Germany, will not fall short of those which have been shown by the medical organization of the Entente.

Whatever may be the result of this war, whether it results in victory, decisive or constructive, for one side or the other, or whether it terminates in a stalemate, one thing is already certain—there will be “no peace without victory,” for victory, triumphant victory of preventive medicine is assured.

THE ECONOMIC IMPORTANCE OF THE COMMON COLD.

A patient picks up from the desk of his physician the manuscript of an article and reads the title, “Technic of Perineocolporectomyomyectomy.” “I dare say,” says he, “that is all right, but I have a cold in my head; what are you going to do about it?” There is the rub—what can we do about it? If our patients were not familiarized to the verge of contempt with colds in the head, we might try telling them that they were suffering from acute rhinopharyngitis with incipient sinusitis, and thus be able to intimidate them into obeying the therapeutic indications, the first and the most important of which is to remain indoors in an equable warm, but pure atmosphere. The common cold, however, is too familiar a visitant to be viewed by most people with this amount of respect, and, although I suppose we all of us think, perhaps justly, that we understand the treatment of such a condition in the favorable circumstances just alluded to, I doubt if any of us can do much in the way of therapeutics for acute coryza in the patient who persists in going about his daily occupations.

Yet, even in the case of the self-limiting cold, by which I mean coryza which does not give rise to any especially serious complications, the economic loss must run into millions of dollars annually in every great city. It is doubtful if even the postalcoholic headache makes for so much inefficiency as does the misery of a cold in the head. The victim struggles through his work, or as little of it as will pass muster, and it is doubtful if what he does has an efficiency of 50 percent while the mental condition associated with the suffusion of the conjunctiva and the swelling of the lining membrane of the sinuses must frequently give rise not merely to loss of efficiency, but to positive bad work.

It is improbable that any satisfactory therapeutic methods for dealing with these cases is available, though this is a question that has not received adequate systematic investigation. The establishment of a clinic for the examination of these questions might well prove a profitable investment for large employers of labor, especially of indoor labor.

Until some such investigation has resulted, if it ever results, in

therapeutic indications, it is on the shoulders of preventive medicine that the task of reducing this discomfort and economic loss must be laid.

The line of action must, as usual, be double—personal prophylaxis and general preventive measures. In the matter of personal prophylaxis, authorities seem fairly well agreed that much can be done in persons liable to take cold by the correction of certain recognized predisposing causes. Gastrointestinal disorders are common in such persons, to a degree which is undoubtedly significant. These must be corrected and in some cases the diet should be regulated. Probably all persons liable to catarrh are better without alcohol. At any rate, they should be especially warned to avoid taking alcohol when there is any probability of their being exposed subsequently to the outer air. Malformations of the nose, especially of the septum, should be corrected and adenoids, if present, removed. Vaccination in such persons is still on its trial, and the results have been conflicting. It is doubtful whether ready made vaccines, however polyvalent, will often give the desired results; usually an autogenous vaccine is more likely to prove satisfactory.

As regards general preventive measures, the proper ventilation of rooms, and in particular the conditioning of the air, are the most important points. There is a tendency not only to overheat apartments and offices, but also to keep the atmosphere in too dry a condition. The air should be as free as possible from dust and other irritating contents, such as smoke. It should be kept in constant, barely perceptible, movement. The temperature should not be above 68° F. nor the humidity below 40 percent of saturation.

It may be asserted with confidence that, if a campaign for the prevention of colds in the head were instituted, the money saving would be enormous. The individual would probably not perceive his economic improvement, but he would be more than compensated for any trouble he might have taken by his greater comfort. Large employers of labor, especially such as the great mail order houses, would certainly derive perceptible economical benefits, and the matter of establishment of clinics for the prevention of catarrh is well worthy of their attention.

THE QUICK AND THE DEAD.

The differences between living and dead matter have ever been a favorite theme with philosophers, while the investigation of the attributes of matter in these two conditions has exercised the ingenuity of biochemists ever since biochemistry has existed.

Speculative methods, as is their wont, have contributed but little to our stock of knowledge. Philosophers who have indulged in speculations on the subject of vitality have invariably returned more or less to their point of departure, and, if there has been any advance, it has generally been in spite of them. Their intellectual acrobatics have exercised as little influence on the progress of real knowledge as the gyrations of the whirling dervish upon the rotation of the globe which carries him inexorably on through space. They have sought to reach across the gap between the living and the dead by methods less promising than those which are employed by the spiritualistic medium in his attempt to bridge the gulf that separates the consciousness of the living from the consciousness, if it exists, of the departed. Of the two classes, the latter has, in every sense of the word, been the more successful in obtaining results, whatever may be the ultimate interpretation of these results. The speculative method, though it has led us nowhere, has caused us much profitless wandering in bypaths of idle guesses and brought us into much intellectual danger from the quicksands of error. It has proved itself as useful for solving the problems with which it purports to deal as the theological and scholastic methods, adopted by the opponents of Columbus' inductions as to the existence of a new world and of Galileo's theories of celestial mechanics, were for arriving at the truth on the propositions to which they were applied. Columbus, setting out in his frail vessels across the hostile and apparently limitless ocean, by dogged patience and persistence in the face of opposition, justified his analysis of the slender objective indications which he had possessed by his stupendous achievement in the discovery of the Western Continent.

In no other manner can we bridge the gulf, if ever it is to be bridged, between living and dead matter, between the conscious and the unconscious.

The biologists, and chief among them the biochemists, are patiently building a bridge across that gap. They do not know whether the gap can ever be crossed, whether their bridge can ever be completed. But each of the workers is patiently and hopefully building in his piece of the structure. To some it has been given to contribute great spans, to others a single rivet represents their life's work. The greatest advance so far made is undoubtedly the achievement of the synthesis of the polypeptides, bodies so closely resembling the simpler proteins in composition and behavior that the conclusion is inevitable that a continuation of the process by which they were made must finally lead to the production of substance equal in complexity and in size of their molecules with the proteins that make up living matter.

The most important contribution of recent times has been made by Dr. Shiro Tashiro, the publication of whose work, "A Chemical Sign of Life," marks a new epoch in the study of vital phenomena.

One of the most perplexing problems in biochemistry is the elucidation of the nature of the phenomena accompanying nervous conduction and, therefore, ultimately the fundamental, physico-chemical basis of consciousness. It was known that the conduction of impulses along the nerve fiber was accompanied by electrical changes, and it had been deduced by one of the principal workers on this subject, Prof. Waller, that there must be a simultaneous disengagement of carbon-dioxide from the nerve fiber. In other words, the conduction of the stimulus was what is ordinarily called a vital phenomenon. It is not necessary, in this place, to go into the details of the argument which lead to this conclusion; suffice it to say that it was based in part on the difference of the electrical behavior under stimulation of nerves in ordinary air and in an atmosphere of carbon-dioxide and in part on the existence of the staircase phenomenon. The most delicate methods available until recently had, however, failed to discover any evidence of the production of carbon-dioxide during the passage of stimuli along the nerve fiber, and partly for this reason and partly as the result of calorimetric observations it was generally believed that the passage of such a stimulus was a purely physical phenomenon.

Things were in this state when Dr. Tashiro commenced his work. He has devised an instrument which he calls the biometer, and by chemical methods of the most exquisite delicacy he has been able not merely to demonstrate the production of so small an amount of carbon-dioxide as one-ten-millionth of a gram, but also to measure it. By these means he has shown conclusively that a living nerve respire, and that during the conduction of a stimulus the metabolism of the nerve fiber is augmented, as is shown by the increase in the quantity of carbon-dioxide produced. Dr. Tashiro has further shown that there is a strict parallelism between the amount of carbon-dioxide produced by the nerve during stimulation and its ability to respond to that stimulation—in other words, its irritability. Thus the amount of the gas produced falls rapidly with anesthetization and disappears with death. Objections raised by the mechanistic school on the first announcement of Dr. Tashiro's results have been proved groundless.

Physiology has, therefore, taken another great step forward. Whatever may be the intimate mechanism of the phenomenon, nerve conduction has been proved to be accompanied by metabolic activity in the fiber and not to be a merely mechanical phenomenon. Moreover, workers are supplied with a new method of wide application and of surpassing delicacy. The carbon-dioxide disengaged by the respiration of a single fish egg or of a single living grain of wheat can be detected and estimated. This achievement adds fresh laurels to the wreath of the University of Chicago, in whose Department of Physiological Chemistry this remarkable work has been carried out.

HEALTH INSURANCE.

One can scarcely open a medical journal nowadays without finding one or more articles for or against compulsory health insurance. Many of these are well thought out and valuable contributions to the subject, but of others it would be an abuse of language to dignify them with the name of discussion. They are too often diatribes dictated by prejudice and informed with ignorance.

In pursuance of the policies announced in the January number of the *INTERSTATE*, there will be presented in an early issue a collective abstract and critical review of the serious literature on this vital and highly topical subject. This will deal with the criticisms, destructive and constructive, that have been addressed to the general proposition of compulsory health insurance and to particular legislative projects.

It is hoped that this will lead to a healthy discussion of the matter in our columns, so that the medical profession in this country will not, as did their brethren in the United Kingdom, sulk in their tents and find, too late, that the Legislature has acted without consulting their vital interests. The views of all sides will be given equal hospitality, provided they are presented seriously and supported by relevant arguments. I admit myself, at present writing, a convinced partisan of compulsory health insurance, but this, I hope, is not incompatible with an ability to do justice to the views of those who object to such legislation.

All true progress is the resultant of the healthy interplay of action and reaction.

However competent the champion of a cause may be, no matter how good his cause, he can never so efficiently work out a constructive policy as when he does so under the lynx-eyed vigilance of honest opponents. For the due execution of the delicate movements of the hand, the constant and steadily balanced action of opposing groups of muscles, is essential. Had Pasteur had for an opponent one less able or less persistent than Bastian, his work on abiogenesis would have remained incomplete, something would have been lacking to his triumph.

In the order of this universe, fanatics have their place. It is theirs to cry down abuses, to stand amid the mocking multitude and clamor for reform. Theirs is also the higher role of inspiring, often by the example of sublime sacrifice, the reforming activities of less ardent souls. But it is not to such that should be intrusted the execution of the project.

The soundest legislative reforms are those enacted by bodies whose views are doubtful until both sides have been heard.

But the kind of healthy opposition for whose usefulness I am pleading is not of that order which consists of jerking the arm of one who is, let us say, carrying the beans.

The opposition to compulsory health insurance falls into three classes—prejudiced, interested, and rational.

Prejudice may find echoes in the minds of a small minority, but it cannot long sustain a campaign against reason.

Interested opposition, while it remains hidden, using as a stalking horse the natural conservative instincts of the profession, may be effective. But once forced into the open, it is doomed to exposure and defeat.

Rational opposition, opposition based on intimate and disinterested conviction, will ever be as formidable as it is desirable. Such as has so far been put forward has been rather criticism of particular projects than of the general proposition of compulsory health insurance.

One argument against compulsory health insurance that is frequently used is that such legislation is un-American. This takes two forms. In one it is alleged that the un-Americanism of the proposed legislation is to be found in its restriction of personal liberty. In the other the appeal to American sentiment is based on the supposed stratification of society that would be legally sanctioned by such legislation.

The former argument is based on a misconception of the nature of that liberty for which this great republic stands, coupled probably with ignorance of the conditions prevailing in other countries.

American liberty is essentially political and religious liberty. Liberty of individual action is a thing which the American citizen surrenders with remarkable ease, conscious that, in doing so, he is consenting to restrictions and not having them imposed on him from above. The prohibition laws, the antinarcotic laws, the restrictions on marriage on eugenic grounds, and a multitude of other examples of this voluntary surrender of individual liberty in the interest, real or supposed, of the common weal crowd to one's mind. The police of this city, Chicago, has and exercises more power of control over the private conduct of citizens than is possessed, in nonpolitical matters, by the police of any European city, Petrograd and Vienna not excepted.

So far from being un-American, the sacrifice of personal liberty in the interests of public welfare has long been one of the characteristic tendencies of American legislation.

The other form of this attack, that which presents the danger of striking at the fundamental character of American institutions by the establishment of class division lines, is more serious and more worthy of our respect. A little consideration will show, however, that this fear is groundless, or, perhaps, it would be more correct to say that such legal stratification exists already and has not worked evil to the democratic institutions of this country. Compulsory education, and *free*, exists. There is a class which must

educate its children, and, to do so, must avail itself of state supported schools; there is another which does not need and does not avail itself of state aid for the education of its offspring. The latter must, therefore, be paying for the former.

The work of the government is, in part, financed by the proceeds of the income tax. But this tax is imposed only on those whose assessed revenue is more than a certain minimum. Yet all profit by the appropriations.

Another argument, put forward by the statistician of an insurance corporation, savors of the game played at fairs in all countries and known in England as "Aunt Sally" and in France as "*Le jeu de massacre*." In this dolls are put up and the competitors endeavor to knock them down with appropriate missiles.

The writer in question, putting up, as the chief argument advanced by the advocates of compulsory health insurance, the alleged relative improvement in the public health that has resulted in the countries where it has been adopted, proceeds with the easy task of knocking it down. One is tempted to use the vernacular and to ask the learned mathematician, "Where do you get that stuff?" But we know the answer—he evolved it out of his moral consciousness, in the interests of his employers.

That compulsory health insurance, in some form, will soon be on us is the conviction of most political students. Let us not attempt to stem that rising tide with the Mrs. Partington's mop of prejudice, or with the irrelevant statistical incantations of interested actuaries, but let us rather gather timber and build us a raft or a boat in which we may ride the flood in safety.

COLLECTIVE ABSTRACTS

NEUROLOGICAL SURGERY.

By ERNEST SACHS, M. D., of the Editorial Staff.

No group of articles has occupied a more prominent place in foreign journals than that on war wounds of the central and peripheral nervous system. Many of the contributions are brief reports of a few cases studied and observed over but a short period of time. The important features of these cases can be obtained only from prolonged observation, especially in the case of cerebral and peripheral nerve lesions. The late results will unquestionably be made the basis of many further studies.

Of all the articles read, I have been most impressed by the paper by Holmes and Sargent¹ on injuries of the longitudinal sinus (a study of over 70 cases), and the Goulstonian lectures² delivered by Holmes, based on a study of 300 spinal injuries observed by him and Sargent.

In the former piece of work, after describing the anatomy of the cerebral veins in relation to the longitudinal sinus, the authors develop a characteristic symptomatology. This is due to the thrombosis of one or more of the four groups of veins entering the sinus. Motor symptoms were more common in the legs than in the arms and in the proximal segments of the upper limbs than in the distal, thus distinguishing these cases from the paralysis seen in the ordinary hemiplegia due to vascular lesions. Face and tongue involvement were very rare, while speech disturbances never occurred. In the involvement of the lower extremities the distal movements suffer more than the proximal. These facts depend on the relative arrangement of the cortical motor centers and that of the cortical veins. Rigidity coming on early and corresponding to the motor involvement is a common occurrence; it is extreme in character, and the patients assume the position of a cerebral diplegic, but develop no contractures.

The sensory disturbances were equally interesting; pain, temperature, and tactile sensibility were undisturbed, while localization of tactile stimuli and sensibility, recognition of position and passive movements of limbs and of form, shape, and size, as well as discrimination of compass points, were seriously disturbed. This corroborates the previous observations of Head and Holmes on disturbed sensation due to cortical lesion (*Brain*, XXXIV, 1911).

General symptoms of intracranial pressure were very marked in most of the cases.

In regard to the treatment, the authors emphasize two points. The first is that special care is needed to control the serious hemorrhage resulting from elevating a fracture over the sinus. This is best done by removing bone all around the depressed portion. The second is that there is a remarkable tendency to improve shown by these cases, due, no doubt, to the free venous anastomosis permitting a reestablishment of the circulation.

Of his three Goulstonian lectures, Holmes devotes the first to the pathology of acute spinal injuries. The points of particular interest are, first, his evidence showing that the compound granular cells have their origin in neuroglia; second, the occurrence of lesions at a great distance from the main lesion.

These are small disseminated intraspinal hemorrhages and swelling of the axis cylinders. Most surprising were peculiar cylindrical cavities which were formed at times as much as five segments away from the wound and were the only abnormality at these points.

The discussion of spinal concussion that follows is illuminating. Holmes is inclined to accept in part the theory of Fickler that the cord oscillates as a result of the impact, and not synchronously with the spinal column, and consequently becomes bruised by the bony wall, but this he feels is but part of the mechanism. His conclusions are:

1. The structural lesions in the spinal injuries of warfare are rarely sharply limited or circumscribed, and cannot be compared to those produced experimentally in a physiological laboratory. The level of the lesion as indicated by the clinical symptoms often does not correspond with the level of maximal damage.

2. The lesions are so irregular in distribution and severity when the spinal injury is not complete that much care is necessary in drawing conclusions from the clinical symptoms alone on the functions of parts which it may be assumed have been involved.

3. Secondary changes may occur later in the cord, which can alter or modify the clinical symptoms.

In the last two lectures the clinical symptoms are discussed. In the 300 cases seen there were examples of injury to every segment from the second cervical to the conus.

The segmental level of the lesion can be as accurately determined by the motor paralysis as by the upper border of the sensory disturbance. The author describes a valuable method of differentiating paralyses of the various intercostal muscles by placing the fingers on the intercostal spaces and noting the difference between paralyzed and nonparalyzed muscles on deep inspiration. He also points out that the differentiation of lesions of the eighth to eleventh dorsal segments may be possible by noting involvement of the upper and lower rectus abdominis as well as obliqui abdominis.

An interesting series of observations record marked hypothermia, some patients living several days with temperature ranging between 85° and 90°. These low temperatures were accompanied by a slow pulse rate, 22 being the lowest observed.

Under the sensory disturbances, Holmes speaks of a number of unusual findings. Some cases throw light on the mode of decussation of the sensory fibers of the second order which carry pain, temperature, and touch, and the obliquity with which they cross to the opposite side of the cord. The author did not have sufficient pure unilateral lesions to determine the number of segments necessary for the complete decussation of each set of fibers of specific sensory function. In the midthoracic region, pain and thermal impulses cross quickly, while in the upper dorsal they take two to three segments to decussate. The decussation becomes slower the higher one goes in the cord. Homolateral astereognosis was found after destruction of the homolateral dorsal column, confirming Head and Holmes' previous observations on this subject.

In regard to prognosis, Holmes gives two valuable guides. If after a few days there is some tone in the muscles of the lower limbs, some recovery may be expected. Secondly, the amount of reflex movement on stimulation of the soles varies inversely with the severity of the injury.

In regard to treatment he says but little. Certain cases that show signs of cord compression should be operated. Cystitis has been greatly benefited by suprapubic drainage. The patients should not be moved for several weeks, as movement may bring on secondary changes.

By contrast with these papers, there is little of real value on cranial

wounds; thus Tilman's article³ lacks the neurological point of view. He has studied his cases mostly with regard to infection. Foreign bodies should be removed, but in each case the desirability of this must be weighed against the danger of spreading the infection. He warns against operating these cases unless the proper facilities are at hand, which is usually not the case in field hospitals. He uses no drains, but merely covers his wounds with aseptic gauze.

Trotter's paper¹⁰ contains a good discussion on the pathology and physiology of traumatic cerebral lesions and the modes of action of cerebral lesions. The latter part of the paper is devoted to the clinical types of cerebral injury, with a discussion of the diagnosis and treatment. There is nothing new in the paper.

A very interesting well-illustrated paper is that on roentgenography in the localization of brain tumors by Heuer and Dandy.⁴ There is not much in the paper that is not to be found in Schüller's book published in 1912. He, however, dealt with the broader subject of x-ray of the skull, while they deal with it only from the point of view of brain tumor diagnosis. Their conclusions are summed up under eight captions. Of these the most important are:

1. The signs of increased intracranial tension are, separation of sutures, convolutional atrophy, and destruction of the sella turcica.

2. Further diagnostic signs may be local changes due to tumor destruction of the sella in hypophyseal disease, local hypertrophy or local atrophy over the site of the tumor, and local unilateral vascular changes.

Bearing also on this question of intracranial diagnosis is the important experimental work of Parker on choked disc.⁵ His work seems to prove that the greater amount of swelling is in the eye that has the lesser amount of intraocular tension. If this proves to be correct, no localizing value can be attached to unilateral swelling. Leslie Paton's work some years ago tended to prove this. It, however, also bears out Victor Horsley's contention that the amount of swelling in an eye is of little significance, but that the age of the histological process is of greatest value.

On war surgery of the peripheral nerves a large number of papers have appeared. Of these, Thöle⁶ and Hofmeister's⁷ are among the best. The former in a 125-page paper discussed every conceivable phase of the 43 cases of nerve injury he has had. The article is not well arranged and does not add much that is new. At the outset he discusses the changes that occur after partial and complete nerve blocking. He has tested Head and Sherrren's observations, but cannot entirely confirm them. It is, however, to be questioned whether he understood English, for he considers glossy skin to be synonymous with "weich, kühl, und feuchte Haut." His remarks about "commotio nervi" are interesting—that is, the condition of nerve paralysis unaccompanied by gross nerve injury. He inclines to the view that there is an anatomical basis for such a disturbance.

His operative indications are these: no operation for sensory disturbances, but only for paralysis or pain; in cases of paralysis with partial reaction of degeneration, postpone operation; in cases of paralysis with complete reaction of degeneration, operate as early as possible.

The author's results are very poor, but this may in part be accounted for by the severe infections and extensive injuries the patients sustained. In bridging large defects he refers to the work of Hofmeister, which is very clever, and, if it proves a successful method, will prove a valuable addition to the surgery of peripheral nerves. Hofmeister bridges defects by implanting the proximal and distal ends of a nerve into adjacent intact nerves and making the intact nerve act as a bridge for the nerve fibers. Sometimes one nerve is made to serve as a bridge for several injured nerves. His ingenious method is illustrated by many diagrams.

Peripheral nerve surgery has, however, received a truly fundamental contribution in the work of Lewis and Kirk.⁸ They have bridged nerve defects by tubulized autotransplants of fascia. This method, which has proved surprisingly successful clinically, they have used to study the process of nerve regeneration. Their conclusions are as follows:

1. In the immediate vicinity of nerve trauma associated with break of continuity there occurs an accelerated hyperplasia of the neurilemmal elements, which results in the early formation of protoplasmic bands. These develop in both proximal and distal stump, and tend to bridge the defect. Along these protoplasmic pathways the regenerating axis cylinders from the central stump pass. Whether they reach the distal stump and neurotise depends largely on the extent to which these preformed conduits have successfully prepared the way.

2. All efficient regeneration of nerve fibers (axis cylinders) is from the central stump. All regenerating nerve fibers, whether the outgrowth of medullated or of nonmedullated axones, are in their early stages nonmedullated.

3. All medullation begins proximally and proceeds distally, appearing only in those parts of the new axis cylinder which have acquired an age of five or five and one-half weeks (in the dog).

Elsberg's book⁹ is the first in English devoted exclusively to surgery of the spinal cord. It is a profusely illustrated work of 321 pages, divided into three parts. First, the anatomy and physiology of the cord and the symptomatology of surgical spinal disease; second, operations upon the spine, spinal cord, and nerve roots; third, the surgical diseases of the spinal cord and membranes and their treatment.

Elsberg has shown very clearly the advantage of specialization in this work. His results are excellent, and, when compared to those of continental surgeons, quite striking.

As the book is a record of personal experiences in many places, it is not well balanced; thus vascular diseases of the cord, undoubtedly a rare condition, and intramedullary tumors, a subject Elsberg has been interested in particularly, receive much more attention than they deserve. On the other hand, fractures are given but little attention, and, whereas the author is opposed to operation if the cord is completely severed, he does not state clearly enough what constitutes his operative indications.

In reading the book, one wonders if it is designed for the beginner or the specialist, since the author goes into extraordinary detail about lumbar puncture and then at another place describes points in the surgical anatomy of the cord which only a few can appreciate. There are a number of illustrations which might be dispensed with, as they seem to add little of value. This is particularly true of the chapter on x-ray, twenty-four pages in length, which has twenty-three illustrations, fourteen of which are full page. It seems a pity that so fundamental a point as the relation of the segments of the cord to the vertebrae should have been so poorly illustrated. On page 50 the paragraph beginning "in addition to these reflexes," is unintelligible to the reader, as no reflexes have been mentioned in the preceding pages. It should follow the table on page 51.

References to literature would greatly enhance the value of the book, as would also some remarks with microphotographs on the pathology of spinal tumors.

These points can readily be corrected in a subsequent edition. The book should prove of value to surgeons, both because of its detailed description of the operative procedures and its good descriptions of the methods of determining the level of lesions.

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STUTTERING.

By LOUIS K. GUGGENHEIM, M. D., of the Editorial Staff.

For hundreds of years stuttering has been observed and written about. The methods suggested for its cure are legion. It has always furnished a most fertile field for charlatans, and probably will continue to do so until the medical profession interests itself in speech problems. At present the only satisfaction derived from physicians by parents of stuttering children is the statement that they will outgrow it. Stuttering is one of the most distressing of the neuroses, and deserves to be taken as seriously by the physician as it is by the patient.

Why do people stutter, and how can they be helped? Gutzmann¹ believes that, although there are abnormal psychic manifestations in stutterers, the speech disturbance itself is the primary condition, and is due to defective coordination, which results in speech inhibition. All the psychic disturbances, according to this writer, are directly due to the embarrassment and hypersensitiveness of the patient. Treatment, he believes, should be directed toward the defective breathing and disturbance of articulation. Froeschels² is undecided as to whether the speech disturbance causes the psychic abnormalities, or whether the defective articulation, abnormal breathing, accessory movements, etc., result from a psychic disturbance. Although he goes into quite as much detail concerning breathing and articulation exercises as does Gutzmann, he admits that, where any benefit results, it is probably due to the suggestive effect of the exercises. Liebmann³ believes stuttering due to nervousness. He is convinced that all breathing and articulation exercises are not only worthless, but actually harmful to the stutterer. He treats the condition chiefly by means of speech imitation. Scripture⁴ thinks stuttering a result of a mental condition in which there is a serious disturbance in the individual's attitude toward other people—an innate timidity, he believes, is the underlying cause. The diseased state of mind, arising from excessive timidity, manifests itself in speech peculiarities that tend toward a condition of isolation which will enable the person to avoid occasions where he will suffer on account of his timidity. Scripture's treatment of stuttering consists of (1) teaching the patient to use a normal voice in place of the harsh stutter voice, (2) teaching the patient to relax, (3) aiding the patient to develop spontaneity in speech, (4) exercises of different kinds. When these methods fail, an analysis of the patient's mind is carried out.

In a recent publication by Bluemel⁵ the author claims to have discovered the true cause of stuttering in a transient auditory amnesia. Swift⁶ summarizes as follows: "Psychoanalysis reveals stuttering as some vague trouble in the personality. Psychological analysis shows stuttering is an absent or weak visualization at the time of speech. This new concept of stuttering as faulty visualization may be called visual center asthenia. This lack or weakness in visualization accounts for all the numerous phenomena of stuttering in severe, medium, or mild cases. A new treatment is indicated."

Appelt⁷ believes in Adler's theory of physical inferiority. The symptom stuttering results, primarily, according to Appelt, from organic inferiority of the mouth zone, which, in combination with other defective regions, brings about a psychic disturbance which tends to fix the stutter habit. Appelt's treatment of stuttering is based entirely on Adler's neurosis theory. The

stutterer is psychically analyzed, and all the unconscious elements which have helped to constellate the feeling of inferiority are brought into consciousness and all the exaggerated compensatory strivings are made clear to the patient. In Appelt's writings the Freudian libido theory of the neuroses is repudiated. To quote Appelt: "The neurosis is not a system of libido, but a defense system born of the neurotic mastering compulsion to bring about in every possible way an increase in character force in order to escape the intolerable feeling of weakness and unfitness.

Stekel⁸ refers to stuttering as an anxiety hysteria. Primarily the fear is one of divulging, through speech, some secret. Later the fear extends to the speech itself. Stuttering, according to this investigator, is a psychic betrayer comparable to psychically determined "slips of the tongue" and mistakes in writing, so frequently observed in the normal. An unconscious complex protrudes itself between syllables and words. Psychic resistances inhibit the normal fluency of speech—not incorrect articulation, abnormal breathing, nor abnormal vocalization, etc. Reed⁹ believes stuttering to be purely psychic in origin.

There has always existed confusion in connection with the terms "stammering" and "stuttering." Most English and American writers use the two terms synonymously. In view of the fact that the vast majority of works on speech disturbance have been presented by Germans, it seems logical to abide by their nomenclature, which is as follows: Stammering is a speech defect characterized by the inability of the individual to produce certain sounds correctly without, however, speech blocking; in other words, the fluency of speech is not interfered with. Stuttering, in a word, is speech inhibition.

In explaining the various phenomena observed in stuttering, it is advisable to consider, first, the peripheral manifestations, about which volumes have been written, so numerous are the varieties presented by different patients. Certain peripheral symptoms are, however, common to all stutterers—e. g., abnormal breathing, defective articulation, monotony of voice, quivering of the *alae nasi*, and, in the early stages, accessory movements.

The normal individual, when speaking, uses rapid inspiration and prolonged expiration. Speech begins with the beginning of expiration. The stutterer uses a very rapid expiration, and frequently does not begin to speak until expiration is almost completed. This and other abnormalities of respiration are the result of exaggerated motor impulses, which serve as aids to an unconscious desire for speech inhibition. The defective articulation resulting from an incoordination of the muscles of speech is centrally caused by a double motor impulse arising from the two conflicting desires—to speak and to not speak. The harshness and monotone quality of the stutterer's voice are the results of the use of the hard intonation and the inability to relax the muscles of the larynx. The accessory movements represent voluntary efforts to down the psychic conflict and so aid speech. These movements, which in the beginning are purely voluntary, soon become automatic habits. So intimately do they become associated with the speech process that many patients are unable to speak at all when the movements are prevented.

Centrally, stuttering probably results from two conflicting desires—a desire to speak, which is conscious, and a desire not to speak, which is unconscious. The motive power of the inhibition seems to be an emotional escape from incompletely repressed desires which are incompatible with the ego of the individual and with the conventions. The fear associated with speaking is in reality not a fear that speech will not be forthcoming, but a fear of divulging, through speech, unconscious material. This explains why practically all stutterers are able to speak normally when alone, but experience marked inhibition when in the presence of others.

Physiologic stuttering is observed at times in the speech of everyone, especially in childhood. In early life it is the result of imperfect auditory verbal imagery. The little boy runs into the house to tell his mother that he has seen a circus parade. In his excitement the not yet perfectly formed auditory verbal image of the word "circus" causes the child to stutter with this word. The wise mother, noting the child's excitement and his uncertainty as to the pronunciation of the word, makes no comment, and all is well; the next time the word is spoken there is less or no difficulty. The unwise mother comments on the fact that her child has stuttered, and that, if he does such a thing again, he may become a confirmed stutterer. In many cases the child is punished for having stuttered or is scolded for having been careless in his speech; all this with the hope of preventing a recurrence. When nothing is said, the child remains unconscious of having stuttered. When scolded or punished, he fears, the next time he has occasion to speak to the same individual, a repetition of the stuttering and of the punishment. The treatment of the child by the unwise mother amounts to a psychic trauma, which, combined with a neurotic constitution, may result in permanent stuttering.

Every adult manifests physiologic stuttering at times—for example, when greatly embarrassed, when in a state of doubt concerning the advisability of saying what he is about to say, when telling a falsehood. Here we have the occasional conscious conflict between the desire to talk and an inhibiting force, which latter is almost constantly present in the confirmed stutterer.

A very common constellating force in stuttering is the habit of keeping certain things from the parents, notably masturbation. The child feels that he has done something wrong; something which he dare not tell his parents. When questioned, he is torn between the desire to tell the truth and the fear of divulging his secret. In such a case the child may hesitate, redden, and finally blurt out with much stuttering a denial of everything. This usually does not occur if the child has been properly approached. After a conflict like the above the child fears a repetition of the telltale stuttering, and, fearing it, brings it about.

Stuttering may be developed through association with a stutterer. After an exhausting illness, stuttering sometimes manifests itself. In such cases the speech defect must be looked on as a result of a generalized weakness of all psychic processes, including auditory verbal and kinesthetic verbal imagery. Such cases of stuttering usually clear up as soon as the individual has regained his health.

Stuttering sometimes results from stammering. The writer had referred to him a boy, aged 9, who was just beginning to manifest symptoms of stuttering. He was a marked stammerer. The sounds of the third articulation zone he was unable to utter. "I eat cake and drink coffee when I go to grandmother's" he pronounced in the following manner: "I eat take and drint toffee when I do to drandmother's." Innately timid and hypersensitive, and exposed to the ridicule of other children, especially at school, he had developed a fear of speaking and being made fun of. At times, of course, he was forced to speak at school. On such occasions a terrific conflict would be felt. He wanted to recite, and at the same time feared speaking and being laughed at. Had his paragammacism not been cured, the boy would surely have developed into a confirmed stutterer. Such children should be kept out of school until the stammering is entirely cured and until the psychic equilibrium has been restored.

Stuttering sometimes follows shock from an accident, from practical jokes, ghost stories, surgical procedures without anesthetic, etc. Certain it is that in such cases there is present the neurotic constitution which makes the development of the neurosis possible.

A fact worthy of note is that the stutterer is very frequently an only or

favorite child.¹ The only or favorite child is unprepared to cope with reality. He has never learned to give up, to do without, to meet obstacles with firm determination to overcome them. When he comes into contact with the world outside his family—that is, with reality—he finds it extremely difficult to adapt himself to his environment, which is always quite different from that at home. His infantile unconscious self rebels, and consciously he is discouraged and unhappy. In the course of treatment it is frequently extremely difficult to arouse in such stutterers a genuine desire to overcome a speech defect which offers so splendid an excuse for keeping away from people and work—in a word, from reality. Such individuals unconsciously desire to return to the parental home, where they were wont to be the centers of attraction.

In the treatment of stuttering it is seldom necessary to devote much time to the peripheral manifestations. By means of confessions, free associations, etc., it is usually possible to explain the patient to himself and so transform his abnormal attitude toward the world into a normal one. In the most favorable cases many months are required in this effort toward reeducation. Individuals past the age of mental plasticity are not amenable to any form of treatment. Children can frequently be cured of stuttering by simple speech imitation.

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ETIOLOGY OF RENAL INFECTIONS.

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The whole chapter of renal infections exists in a very complicated and unsettled condition; even the terminology is frightfully confused, and scarcely any two writers use the same terms to illustrate the same process. As Cabot says, "the phrases metastatic, embolic, hematogenous, and blood borne have been used with a looseness which defies comprehension." There has been no phase more decidedly complicated and less thoroughly understood than the manner in which the infections reach the kidney, unless it be the variegated pathological pictures which are produced after the organisms have settled there. These are frequently very intricate, and show many types of lesions and kinds of infections.

This confusion has in the last few years stimulated considerable investigation on the part of men interested in this branch of medicine. The organisms commonly associated with renal infections are the colon bacillus, staphylococcus, tubercle bacillus, streptococcus, the gonococcus, typhoid and paratyphoid bacilli, pyocyanus bacillus, and the pneumococcus. Of these the colon bacillus is decidedly the most frequent. Thomas, of Mayo clinic, in a review of 240 cases of kidney infections, found 63 percent were due to the colon group; Caulk, in an analysis of 182 cases, found 57 percent due to the colon bacillus alone, 17 percent mixed, and 23.5 percent due to the staphylococcus. The staphylococcus was very commonly associated with calculus. Cabot and Crabtree, in their analysis, have found the staphylococcus more frequently than we had expected, and often obtain coccal cultures from the kidney when the colon bacillus alone had been found in the urine. They lay great stress on staphylococcus infections of the kidney, as this type of infection is often the one which demands prompt surgical attention, in contradistinction to colon infections, which are often of a milder type and more amenable to less drastic measures.

The whole problem of settling the confusion regarding the bacterial findings will be solved by more thorough technic in securing specimens, by accurate bacteriological study, both in cultures and in stains, and in thorough investigation of pathological specimens, as it is so frequent that a kidney may be the seat of several infections, and have alternate periods when one organism and then the other may show. Such an occurrence is familiar to all. The checking up of these findings, with the ultimate picture in the kidney, will lead to more accurate ideas of the types of lesions produced by the various bacteria. It has been clearly demonstrated that the colon bacillus produces pelvic lesions and various grades of pyelonephritis, while the coccal lesions are more prone to be cortical, producing cortical abscess, multiple septic infarcts, described by Brewer, subcapsular abscess, acute septic nephritis, and perinephritic abscess. For this reason one is liable to have more pronounced urinary findings with bacillary infections, and very few and often no urinary findings with severe coccal lesions. It is on this account that the acute renal infections are often very deceptive.

Renal infections depend on the local condition of the kidney itself and on the general constitution of the individual. Infections occur quite frequently in perfectly healthy kidneys, but are more frequent in kidneys which are the seat of pathological processes, such as stone, tumors, obstruction, malposition,

and in individuals with constitutional disorders, such as furunculosis, gastrointestinal disorders, grippe, tonsillitis, osteomyelitis, and other acute infectious diseases. In the writer's series of 182 cases, osteomyelitis, tonsillitis, and intestinal disorders were the commonest predisposing factors in renal infections in children.

MODES OF TRANSMISSION.

The mode of transmission of a tuberculous infection to the kidney is pretty firmly established, and we will concern ourselves in this abstract with the etiology of the nontuberculous infections, which exist in such a bewildering state. For instance, just why we have accepted the theory that coccal lesions should occur in a kidney from a boil or carbuncle, reaching it through the blood stream, and bacillary infections, particularly in infancy or pregnancy, by way of the ureter, is hard to understand. The path of transmission generally accepted until recently has been the one of direct extension along the urinary passages, chiefly because of the anatomical relationship. This theory, held for so long, has been definitely exploded, so that now it is no longer believed that bacteria reach the kidney by direct extension up the ureter, unless there is some interference with the emptying of the ureter, either by mechanical obstruction or inflammatory changes in the ureter. And indeed this is a very fortunate and comforting fact, as it makes ureteral catheterization from an infected bladder to a kidney much less serious. As a matter of fact, one of the chief proofs that ascending infection up the ureter is highly improbable is afforded by the infrequency of renal infection following ureteral catheterization. For bacteria to reach the kidney by such a path they would have to travel the reverse current and implant themselves on a mucous membrane somewhat difficult to infect under normal conditions.

Obstruction is the important factor in ascending infection up the ureteral lumen. Reverse peristalsis is considered by Cabot, Lewin, and Goldschmidt to play an important part. Draper and Braasch failed to produce ascending infections unless they kept up a high intravesical pressure for a long period of time. An incompetent ureterovesical valve is an important factor in ascending infection up this tract.

The pyelitis in infancy and pregnancy, which have been held for a long time as representatives of ascending infection up the ureter, are no longer considered so. The frequent infection in girls was supposedly due to the short urethra, constant soiling of the diaper, frequent wiping of the meatus with a soiled diaper, with a consequent urethritis and vulvitis. It has been shown that the intestinal tract and the pelvis, with their lymphatics and blood stream, play the important roles, and that infections up the ureter are very improbable. The recent articles by Quimby and Smith are of interest on this latter feature.

To sum up, present opinion is entirely against direct extension up the ureteral lumen in a normal, unobstructed ureter; such ascending extension is held to occur only in case of obstruction and incompetency.

We will now take up the two most important paths of renal infections—the lymph and blood streams. Each mode of transmission is championed by an enthusiastic group of supporters, but, as time progresses, it appears that the side lines are becoming more and more crowded on the hematogenous side of the field.

ASCENDING INFECTIONS BY WAY OF THE LYMPHATICS.

A great deal of experimental work was done formerly on the extension of tuberculosis from the bladder to the kidney by way of the lymphatics, but recently attention has been directed to the same path, as a route for the nontuberculous infections, by Tiatze, Thomson, Kroemer, Mange, Sweet, and Barber,

and more recently by Eisendrath. It was shown by Mascagni in 1787 that the lymphatics of the upper ureter drained into the lymphatic system in the region of the kidney pelvis, and that those of the lower ureter drained into the glands of the bony pelvis. Later Sakata showed that these two series of lymphatics were connected by an intermediate channel. These lymphatic channels are not continuous, but segmental. Hess, in animals, produced a urogenous pyelonephritis which showed bacteria traveling from the pelvis of the kidney out into the kidney by the lymphatics; Muller showed the same thing in man, following the process in serial sections, through the column of Bertini, in the lymphatics accompanying the artery and vein, and concludes that there are centripetal and centrifugal lymphatic systems in the kidney. Sugimura, in quite a series of cases, showed that in acute cystitis the lower part of the ureter was constantly implicated. He concluded that this was due to the lymphatics, because the mucous membrane showed only slight involvement, whereas the lymphatic channels and the adventitia were markedly involved. Francke has shown that there is a direct lymphatic communication between the right kidney capsule and the ascending colon. Bauereisen recently directed attention to the anastomosis of the lymphatics in the internal genitalia and those of the bladder and ureter in the female. He believes that some of the cases of cystitis following gynecologic operations are due to this communication. Kumita has shown a superficial and deep series of lymphatics in the fatty capsule of the kidney connecting with the lymphatics of the diaphragm. He showed that there are lymphatic spaces that connect with the capsule of the kidney and are found under the capsule. The lymphatics pass from the cortex to Bowman's capsule and form a capillary net work in the glomerule, and from here pass along the loops of Henle and the connecting tubules, pass out into the pelvis and go to the regional glands. From these descriptions we see that there is a very freely anastomosing lymphatic channel connecting practically all of the genital and urinary tract. On this ground the advocates of the lymphatic theory have attempted to prove their contention that infection in the lower tract to the kidney is by way of the lymphatics.

The experimental work of Sweet and Stewart, and more recently that of Eisendrath and Schultz, have attempted to prove the ascent of infection from the bladder to the kidney by way of the lymphatics of the ureteral wall. These problems for the nontuberculous infection are similar to the problem worked out by Bauereisen for the ascent of tuberculosis.

Sweet and Stewart, working on ureterointestinal anastomosis, found that infection of the kidney, which is the unfortunate and almost universal complication of such anastomosis, is not directly through the lumen of the ureter, but by way of the ureteral lymphatics. For their claim they seem to offer pretty substantial proof.

The recent work of Eisendrath is briefly the following: He has injected the bladders of animals with cultures of colon bacilli, staphylococci, and proteus without injuring the bladder, trying to simulate the conditions of life. He took urine cultures previously to see that there was no preexisting infection. The animals were killed with strychnin at varying intervals, cultures made from the heart blood, kidneys, and bladder, and serial sections were made of the whole tract. His blood cultures were negative throughout which, according to him excluded the hematogenous path of infection in his experiments. He has been able to trace infections of the bladder to the kidney by way of the lymphatics of the ureteral wall, starting from the bladder, involving the submucous coat, and chiefly the external coats of the wall as far as the kidney pelvis; from there to the renal parenchyma by way of the intrarenal lymphatics, the inner coat being intact. The inflammatory process is characterized by focal lymphoid infiltration around the blood vessels and lymphatics of the ureteral

wall. From his previous negative urinary findings, from negative blood cultures, and by tracing bacteria from the bladder to the kidney by serial sections, he concludes that organisms may be carried from the bladder, prostate, and seminal vesicles in the male to the kidney without obstruction to the ureter, and with an intact ureterovesical valve; and also in the female from pelvic inflammatory trouble directly to the kidney without bladder disease. The advocates of the lymphatic theory of infection believe that the path of infection in pyelitis of pregnancy finds one explanation in these results. They offer also according to these pathologists, a fitting explanation for the frequency of pyelitis in children, particularly females. The same explanation is offered of right-sided renal infections in gastrointestinal disorders, commonly seen in children.

INFECTION BY BLOOD STREAM.

Cabot and Crabtree have produced a considerable amount of work in the last year in an attempt to prove that most renal infections are blood borne. They have done a great deal of clinical and experimental work to prove their point. The first link in their chain of evidence is the consideration of the fact that insoluble substances were proved to have been excreted by the kidney from the blood. They mention the work of Hoffmann, Rutimeyer, and Cohnhein, who showed that fat and cinnabar could be made to pass through a healthy kidney. Later they mention Kraus and Biedl showing colon and anthrax bacilli and staphylococci passing through the kidney. Meyer, Kramer, Walschmann, Brown, and Cunningham have shown that tubercle bacilli are excreted through healthy kidneys. Brown showed that 10 percent of his tuberculosis cases excreted tubercle bacilli in the urine, even with apparently healthy kidneys. Swart and Craig showed that, after a salvarsan injection, the urine of patients with tuberculosis and leprosy showed the bacilli in large numbers. These bacteria and others have been shown by innumerable observers to produce lesions in the kidneys. Whether a kidney will become infected by these bacteria depends on the local condition of the kidney, the condition of the individual, and the type of organism.

In 1915 Kowitz, in a series of children with diarrhea, showed that they first had a positive colon blood culture, the albuminuria later bacteria in the urine, then pus. Cabot and Crabtree, in a series of 32 cases of acute pyelonephritis, obtained positive blood cultures in 40 percent, a higher percentage than is usually obtained in typhoid fever. To substantiate their hematogenous theory of renal infections, they say that frequently they have obtained positive cultures from the blood earlier than from the urine. They have studied this particularly on prostatics with a retained catheter. For example, in one case, on the seventh day after the catheter had been in place, the urine was sterile; on the eighth day occurred signs of urinary discomfort, fever, chills; blood culture a few hours later showed positive colon bacillus; urine negative, but, within twelve hours, positive urine cultures were obtained. At the same time there was a marked drop of renal function, as shown by the phenol-sulphonphthalein test. These authors have also shown that the pyogenic cocci seem to select the renal cortex, producing cortical abscess, capsulitis, capsule abscess, multiple septic infarcts, described by Brewer, and perinephritic abscess, lesions of a much more serious nature than those produced by the colon bacillus group, a group which causes, even in very sick persons, but slight disturbance of renal function and often few urinary symptoms.

These coccal lesions are universally conceded to be of hematogenous origin, and Cabot and Crabtree believe that the colon bacillus infections are of the same origin. They assert that it is a long way from bladder to kidney by way of lymphatics, which are not direct; that it is more probable from the source, that the path of infection is from the lymphatics draining into the

blood stream, then to the kidney. They explain infections in infants with summer diarrhea by this method. They take little stock in Francke's direct lymphatic infection to the kidney by means of direct transmission from the colon, asserting that, if such were the case, the renal lesion would be a focal one rather than a diffuse one. In support of their theory they mention the work of Thiele and Emberton. After peritoneal injections the organisms reach the blood stream and are excreted by the normal kidney, but, if the thoracic duct be opened so that bacteria can escape, no such excretion occurs. Therefore they believe that practically all these infections come to the kidney by means of the blood, which drains various lymphatic territories.

Smith, in a recent paper on pyelitis in infancy, believes that it is always a blood infection, and that bacteria reach the blood by way of the lymphatics, that the infection is secondary to gastrointestinal disorders, acute infections, such as osteomyelitis, tonsillitis, and teeth disease. He believes that the great frequency in female children is due to the fact that infections from the urethra, vulva, and vagina are taken by the lymphatics to the blood, and shows that Schmigdale found the colon bacillus in the vagina in 50 percent of the cases after the second day of birth. Allsberg found the colon bacillus in the urethra of women in 100 percent of the cases examined. There is very intimate relation of the vulva, vagina, and rectum in the female, and their almost constant bacterial flora makes them predisposed to infections.

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ORIGINAL ARTICLES.

CHRONIC INTESTINAL STASIS—MEDICAL TREATMENT.

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In 1885 and 1887 Glénard published in a Lyons medical journal¹ an interesting series of articles on nervous dyspepsia and enteroptosis, giving the symptoms in different stages, the methods of treatment, and the anatomical conditions. It is worth while to summarize briefly his statements.

SUBJECTIVE SYMPTOMS.

Subjective symptoms of the disease, when moderately advanced, "dyspepsie mésogastrique," are as follows:

Feebleness, habitual lassitude.

Sensations indicating difficulty in the digestion of fats, farinaceous foods, acids, raw food, wine, and milk. Predominance of digestive trouble three hours after food.

Appetite good or a need of taking food, "besoin de prendre," "false hunger."

Disturbed sleep, awaking regularly at 2 a. m., followed by more or less insomnia.

Partial relief of symptoms by lying down or sitting; by the ingestion of food. Less distress after more copious meals.

Sometimes pain in right or left hypochondrium.

OBJECTIVE SIGNS.

Loss of flesh.

The patient is thin, pale, slightly subicteric. Countenance sad or sometimes downcast.

Tongue pale, spread out and retaining the imprint of the teeth.

The pulse is small, regular, sometimes very slow, change of position may cause a variation of 10 to 20 pulsations.

The skin is thin, soft, and sometimes dry.

Splashing in stomach between the second and seventh hour after a meal.

Habitual constipation or irregularity of stools, feces ribbonlike or scybalous.

Diminished abdominal tension, prolapse of abdominal viscera (enteroptosis, gastroptosis, and often movable kidney, movable

¹Glénard, F.: *Lyon Médical*, XLVIII, p. 492.

liver, uterine ptosis), diminution, partial or general, of the caliber of the intestine.

A corded state of the transverse and left iliac colon.

FUNDAMENTAL INDICATIONS FOR TREATMENT.²

- A. Raise and maintain in position the digestive viscera.
- B. Increase intraabdominal tension.
- C. Regulate the stools.
- D. Excite the secretion of the digestive tube and annexed glands.
- E. Regulate the diet and aid the digestion.
- F. Improve the constitutional condition.

The treatment demands *simultaneously* the four following elements:

1. An abdominal supporting belt.
2. Daily laxative.
3. Alkalies.
4. Dietetic regimen.

The belt is not to extend above the navel.

In Glénard's opinion a proper supporting belt used prophylactically after childbirth and in common dyspepsia, as well as in the conditions of distinct ptosis, would prevent two-thirds of the nervous dyspepsia of women.

In enteroptosis there is always constipation, insufficiency of stools, even when they appear diarrheal in character. It is necessary to prevent all stagnation of excrement whether it is toxic or not. A daily stool sufficient in quantity and density is essential.

Glénard believed the early morning wakefulness to be due to the disturbed function of the transverse colon, and that proper treatment with this in view effects a cure. This insomnia resists hypnotics, or yields to them only with damage to the organism. Suitable laxatives are the proper treatment.

Laxatives used:

Sodium sulphate 4 grams.

Magnesium sulphate 3 grams

Dissolved in $\frac{1}{2}$ glass water, or

Hunyadi, $\frac{1}{2}$ glass, or

Rubinat, $\frac{1}{4}$ glass, or

Carlsbad salts, 1 coffee-spoonful.

The above on awakening.

If the movements with the salines are too loose, give 5 centigrams aloes at bedtime.

Alkalies:

Sodium bicarbonate.

Vichy (Lardy, Célestins, Lucas, Mesdames).

Warm Vichy (Hôpital, Grande Grille, Channel).

Sodium bicarbonate, 60

Magnesia, calcined, 30

Bismuth subnitrate, 3

} coffee-spoonful during the meal.

²Glénard, F.: Lyon Médical, LV, p. 244.

Diet:

Avoid milk diet.

In the bad cases:

Minimum amount of food (raw beef or mutton (150 grams), 3 raw eggs, café au lait.

Bread, dry, 200 grams.

Apportion as follows:

7:00 a. m.—1 egg, coffee au lait (1/3 milk).

10:30 p. m.—Meat and egg, tea and milk (1 spoonful).

2:30 p. m.—Dry bread.

5:30 p. m.—Meat and egg, alkaline water. 25 minutes' rest (with belt on) before two principal meals. Broiled meat and cooked eggs after three to six days. Diet gradually advanced to include tender white fish, well-cooked green vegetables, cooked fruit, potatoes, rice, carrots, cheese, etc.

Hydrotherapy, electricity, massage, etc., may be employed to improve the general health.

COMPLICATIONS.

If the enteroptosis does not yield to proper treatment, it may be that there coexist diabetes, biliary calculus, round ulcer, cicatricial alterations (post-dysenteric or posttraumatic), or visceral degenerations, sclerotic or cancerous.

ANATOMICAL PATHOLOGY.

Right half of colon often ptosed.

Cordlike condition of transverse colon.

Ptosis of liver and stomach.

One often sees the hepatic flexure lowered to the level of the spine, the right kidney ptosed, the cecum and duodenum dilated.³

It appears that nature has wished to repair the effects of ptosis, for singularly frequently one finds supplementary ligaments running from the under surface of the liver to the colon, as if to prevent its descent. Often there are adhesions between the two sides of the bowel. There result the forms V, M, and S, which one encounters so often in the autopsies.⁴ Such were the views of the clever physician at Vichy.

Lane, in his studies of what he terms "chronic intestinal stasis," seems to have confirmed all the fundamentals of Glénard's teachings and to have carried his theories much farther. The supplementary ligaments become evolutionary bands, the abnormal traction results also in the thickening and it may be the shortening of portions of the mesentery, the appendix is caught up in the supporting bands, obstructed, and becomes the seat of disease, the dragging of the ileal coils or mobile cecum on an ileal band or shortened mesentery may markedly interfere with the escape of the small bowel contents, the loaded ileum and jejunum dragging on the duodenojejunal angle produces duodenal stasis and pyloric spasm. In the stagnating

³Glénard, F.: *Lyon Médical*, 1885, p. 531.

⁴Glénard, F.: *Lyon Médical*, 1885, p. 532.

contents abnormal changes occur. There may be toxemia and ascending infection, with ultimate cholecystitis, pancreatitis, or ulcer, the weakened toxic tissues readily succumbing to infections, and to erosion by the hyperacid gastric juice. This train of evils may be started by obstructive bands or kinks in the ascending colon, transverse colon, or in the sigmoid flexure. Whatever may be the particular variation from the normal, if it causes such delay of the intestinal contents as "to result in the production, in the small intestine especially, of an excess of toxic material, and in the absorption into the circulation of a greater quantity of poisonous products than the organs which convert and excrete them are able to deal with," it is "chronic intestinal stasis" in the sense meant by Lane.⁵ Partial obstruction with toxemia are, in Lane's opinion, the fundamental conditions bringing about, directly or indirectly, most of the serious diseases of the digestive system, and in fact of the whole body, so lowering its resistance that it becomes the ready prey of any infectious or degenerative process.

That the abdominal conditions as described by Glénard and Lane exist, and that this subject is worthy of the most painstaking consideration on the part of the medical profession, there should be no question. To enlarge on all the varied symptoms of intestinal toxemia in this paper is unnecessary and undesirable. We will instead limit ourselves to the discussion of some of the methods of diagnosis, the great frequency of intestinal stasis if certain signs prove reliable and the methods of treatment to be employed.

METHODS OF DIAGNOSIS.

History.—Common symptoms are:

Headache.

Indigestion, bad taste, belching, burning, sour regurgitation. Epigastric discomfort or pain.

Sometimes nausea and vomiting—"bilious attacks."

Constipation, although the movements may be regular or even loose.

Dizziness.

Depression.

Weakness, lack of endurance.

Physical Examination.—Common signs:

Pale and sallow skin, out of proportion to any anemia present.

Weight and strength diminished, cold extremities.

Tongue flabby and indented.

Ptosis of stomach and intestines, gastric wall atonic. Duodenum dilated with gas, but readily emptied by lifting abdomen. Ileal coils often contain gas. The left iliac colon frequently spastic ("corded"). Ileocecal valve incompetent.

Through careful light percussion, aided by auscultatory percussion if needed, the position of the stomach and colon, previously inflated if necessary, may be determined with considerable accuracy.

⁵Lane, Sir W. Arbuthnot: Brit. Med. Jour., November 1, 1913.

The writer in April, 1914,⁶ called attention to the value of some special signs and the method of making the tests in determining the existence of a dilated duodenum, sagging of the jejunum, inflated ileum, and incompetence of the ileocecal valve. These signs are:

1. The presence of a dilated duodenum (D.D.) determined by light percussion over the first portion and percussion with pressure over the second and third portions of the duodenum.

2. Pressure paradox (P.P.), the emptying of the dilated duodenum when the anterior abdominal wall is lifted backward and upward by pressure exerted below the umbilicus.

3. Inflated ileum (I.I.), tympany over the ileal coils when the escape of the contents is unduly retarded from any cause.

4. The determination of incompetence of the ileocecal valve by first massaging the gas from the ileum into the colon, then pressing with the side of the left hand across the mid portion of the ascending colon, and then exerting gentle pressure with the right hand over the cecum. Its contents are not returned to the ileum by this procedure if the valve is functioning normally.

The corded transverse and left iliac colon are usually readily palpable, as pointed out by Glénard, if present in a thin walled abdomen.

X-RAY.

The x-ray has proved itself invaluable in the accurate diagnosis of abdominal conditions, including chronic intestinal stasis, and should be used, if possible, in every obscure case. It is helpful in showing the gastropnoxis so often present, the dilatation of the duodenum, the ileal stasis, incompetence of the ileocecal valve, displacements and dilatations of the colon, and deformities or partial obstructions due to bands.

FREQUENCY OF STASIS.

It is probably safe to say that more than half of all cases with chronically disturbed digestion are suffering from some degree of chronic intestinal stasis, alone or with complications.

In 100 consecutive carefully studied cases with digestive trouble, 72 at some period while under observation gave evidence of dilated duodenum and the pressure paradox sign; 35 of these gave the ordinary symptoms of mild or severe stasis, with no clear evidence of organic trouble; 31 of these cases gave evidence of other troubles, gastric ulcer (12 cases), duodenal ulcer (4 cases), gall stones (2 cases), arteriosclerosis (2 cases), achylia (2 cases), atrophic gastritis (1 case), hyperthyroidism (1 case), epilepsy (1 case), chronic appendicitis (1 case). Eleven of the 35 cases re-

⁶Internat. Jour. Surg., April, 1914, p. 134.

garded as simple stasis showed incompetence of the ileocecal valve at least once. Of the 72 cases showing stasis signs, 7 were operated upon. All showed some abnormal condition producing delay, bands constricting duodenum or colon, adhesions between gall bladder and duodenum, dilated mobile cecum, Lane bands, etc. One had gastric ulcer, one had duodenal ulcer, two had stones in gall bladder, one had gall stones removed previously and now had pancreatitis and jaundice, without the presence of stones.

It is, of course, debatable whether much diagnostic significance attaches to the above signs—dilated duodenum, pressure paradox, etc.—but they do not seem to be found in persons digesting normally. When present in the chronic dyspeptic, improvement seems to go hand in hand with the disappearance of the signs.

TREATMENT OF CHRONIC INTESTINAL STASIS.

There are three groups of cases according to Lane. First group—about 90 percent of the cases, suitable for medical treatment. Second group—requiring corrective surgery, freeing of bands, kinks, etc. Third group—severe cases requiring a short circuiting operation or colectomy.

MEDICAL TREATMENT.

The fundamental indications are almost identical with those given by Glénard thirty years ago.

1. To raise and maintain in position the digestive viscera, particularly the intestines. Also to increase intraabdominal tension when abdominal wall is relaxed.

2. Regulate the bowels and quicken the current, particularly in the small intestines.

3. To correct and aid the secretory and motor function of the stomach.

4. To check putrefactive changes and excessive fermentation in the bowels.

5. To control the diet, with a view to aiding in the above.

6. To improve the constitutional condition.

To support the abdomen, a good belt or spring support is ordinarily most effective, though corsets answer very well in some cases. Whichever is chosen, the physician should see that it is really effective; otherwise it will only raise false hopes, doomed to bitter disappointment. The patient should be taught to maintain correct poise of body, with chest forward, shoulders back, and abdomen drawn in.

The regulation of the bowels is to be effected, as far as is possible, by methods which will not irritate the mucous membranes. The following are helpful: Massage with the pressure so applied as to raise the ileal coils and propel the contents along the colon; special

exercises given to strengthen the abdominal muscles, especially such as can be taken lying on the back; a glass of water should be taken an hour or more before each meal and at bedtime; liquid petrolatum (heavy and highly refined), $\frac{1}{2}$ to 1 ounce on rising and retiring, or one-half hour before each meal, is often helpful. It may cause discomfort or flatulence, in which case it is discontinued.

Extract cascara, 1 to 5 grains; compound licorice powder $\frac{1}{2}$ to 1 dram; phenolphthalein, 1 to 2 grains, or agar-agar with phenolphthalein, $\frac{1}{2}$ to 2 drams, p. c., or an occasional dose of calomel may be given if necessary.

Carlsbad sprudel salts $\frac{1}{2}$ to 1 dram in half glass water on awaking, or similar saline, a full hour or more before breakfast may be desirable for limited periods.

The secretory and motor functions should be studied by means of test meals and the proper treatment given—alkalies, pepsin and acid, pancreatine, tonics, etc.—but only to meet definite indications. It is not desirable to give these patients large amounts of medicine.

The prevention of putrefactive changes in the food and excessive fermentation may in some cases be readily accomplished and in others be a matter of extreme difficulty. The diet and medication must be carefully planned, and corrected from time to time in each case. In general, care must be exercised that the intake of proteids, fats, and sweets is kept within proper bounds, and that the ingestion of irritant articles of food and drink is rigidly excluded. The urine should be kept free from indican, the stools free from bad odors if possible. The digestion is to be so regulated as to avoid gaseous distension.

Outdoor life and systematic exercise—golf, tennis, horseback riding, automobilng, calisthenic and gymnastic drills, general massage, hydrotherapy, or other measures should be encouraged, as may be indicated, to improve as much as possible the nerve tone and muscular vigor of each patient.

The following are abbreviated histories of illustrative cases:

CASE I.

H. B. F., aged 41, married, mechanic. Periodic stomach trouble for four or five years, attacks last two or three weeks. Headaches occasionally. Chief complaint, pain in epigastrium comes on daily between 3 and 4 p. m., gradually disappears after supper, rarely comes during the night.

Physical examination.—Chest negative but for faint mitral murmur. Abdomen shows gastropnoia (G. C. 2 below umbilicus). The duodenum is dilated and empties when jejunum is lifted. There is no tenderness. Ileocecal valve is incompetent. Gastric analysis shows superacidity. H. 64, A. 80. There is no blood in gastric contents or stool. The urine contains indican.

Diagnosis.—Chronic intestinal stasis, gastropnoia, gastric superacidity, possible peptic ulcer. The patient is allowed to continue at work. He is given a bland full diet, sedative and alkaline medication. He is taught to massage his abdomen for three or four minutes twice daily. He is under treatment for

five months. In August, 1916, eight months after beginning treatment, the patient reports that he is "fine." No distress. He looks the picture of health. He requires no medicine, but continues the abdominal massage.

CASE II.

W. A. T., aged 43, married, clergyman. Seen December 13, 1915. Two years ago began to have trouble with stomach, gaseous distension, dizziness, and faintness. There was diarrhea and fever. Unable to do his work for a month. Second attack in December, 1914, stomach upset, weak heart, confined to house for two weeks. In April, 1915, a third attack, sensation of a lump in the stomach. Has suffered ever since. Once collapsed in a department store and had to be put to bed. All his food "seems to turn to gas." Belching gives some relief. Dizzy at times. Appetite good, but afraid to eat. No nausea or vomiting. Never noticed blood in stool. Marked distress and weight in stomach one or two hours after eating, and lasting till food is again taken. Stomach often feels sore. Sour or burning regurgitation. Bowels loose, two or three movements daily. Sleep, awakes about 3 a. m. Seldom able to sleep after this.

Physical Examination.—Chest normal. Abdomen, tenderness below ensiform, dilated duodenum, pressure paradox, inflated ileum. Valve is competent. Ewald Boas test breakfast. H. 74, A. 100. Lavage water shows a trace of blood. There is a trace of occult blood in the stool.

Treatment.—Patient allowed to continue his work. Is given a soft diet, slowly advanced. Tincture belladonna, 2 minims t.i.d. a.c.; sodium citrate, 10 grains; sodium bicarbonate, 10 grains, 2 h. p.c.; bismuth subnitrate, 1 dram on awaking. Abdominal massage five minutes night and morning. After a few months' treatment the gastric acidity fell to normal, the stasis signs disappeared, and the patient felt "like a different man." The blood in the stool had disappeared. In this case it is probable that there was peptic ulcer in addition to the stasis.

CASE III.

Mrs. C. M., aged 19. October 29, 1915. Previous history, some rheumatism four years ago. Appendectomy one and a half years ago. Menstruation regular, lasts seven days. Present trouble, constipation ever since she can remember. Went to boarding school at 7 and no attention was paid to her bowels. Headache over eyes, dizziness and blurred vision on awaking; usually passes away by 11 a. m., even if the bowels do not move. Bowels may go three days without acting. This is often followed by nausea and vomiting. Six ounces of Hunyadi taken this morning has not acted up to 1:30 p. m. Appetite is small, food does not cause distress. Complexion not as clear as formerly. Tires easily.

Physical examination.—Patient is slender, pale and sallow. The lungs are clear. There is slight mitral insufficiency. Abdomen, there is slight gastroptosis and coloptosis. There is duodenal dilatation and the pressure paradox sign. The valve is incompetent. The gastric digestion is somewhat prolonged and there is slight superacidity. The urine shows excess of indican. The stool is alkaline and putrefactive in odor; it contains no blood. The food is poorly digested.

Treatment.—A bland full diet, abdominal massage, supporting belt. Chief medicines: Takadiastase, 3 grains and pancreatin, 3 grains, t.i.d. p.c., and phenolphthalein agar-agar, 2 teaspoonfuls or less t.i.d. p.c. In two months the patient is feeling fine and has gained 10 pounds in weight. The bowels move daily with one dose of phenolphthalein agar-agar. November, 1916, parents report their daughter to be very well, but somewhat apprehensive lest she grow too fat.

CASE IV.

Mrs. M. J., aged 70. History of gastric ulcer nearly thirty years ago. Vomited blood. Had tarry stools. In bed three months. About a year before she could go about. Never thoroughly well since. Has suffered terribly with severe and frequent headaches. For a time there was pain in stomach and between shoulder blades, but in recent years obstinate constipation, gaseous distension, very frequent headaches, backache, dizziness, and asthenia have been the marked symptoms.

This patient is pale, sallow, and has a distressed sad expression. There is gastroptosis and the signs of stasis are regularly present. X-ray examination showed gastroptosis, "healed gastric ulcer, a few pyloric adhesions, pyloric spasm, dilated duodenum. Ileal stasis due to a kink. Probable adhesions of the terminal ileum and cecum."

Medical treatment could be only palliative in such a case. Surgery alone might effect a cure, but the age and condition of the patient make this unjustifiable. So the trouble continues in spite of treatment until an attack of double pneumonia mercifully ends the tragedy.

CASE V.

Miss H. S., aged 30. Stomach trouble for 15 years. There is frequent vomiting two to nine times a day, preceded by pain. There is retention vomiting, bringing up food eaten the previous day. There is consciousness of the stomach or epigastric pain constantly. The pain radiates to the back, slightly to the left or upward. Eating sometimes diminishes this pain. A drink of water causes distress. Belches much gas at times. There is severe clutching pain in right side below free border of ribs. Has taken all sorts of medicines under many doctors. Gastric analysis shows normal acidity. There is no blood in gastric contents or stool.

Physical examination.—Patient is pale, subicteric, thin. Chest negative. There is slight tenderness at times in the region of the solar plexus and to both sides of it. The signs of stasis are frequently present, D.D., P.P., I.I. No satisfactory progress is made in months of painstaking treatment.

Medical diagnosis.—Chronic intestinal stasis, with probable obstruction following chronic ulcer. Operation was performed by Dr. W. S. Bainbridge, who found "strong fibrous band extending from the transverse colon to the gall bladder, constricting duodenum; a band at duodenojejunal angle, extending two inches on the under surface of the transverse mesocolon, causing marked constriction at this point; an ileopelvic band, with an appendicial tie, a dilated ascending colon, a cecum dilated and fixed in internal rotation, and an exaggerated last kink (of sigmoid) were also found."

The operation.—"Constricting bands divided, edges enfolded, appendectomy, cecum and colon plicated and attached to right marginal peritoneal flange. The band fixing pelvic colon likewise divided." Since operation this patient has been greatly improved in health, although still not entirely relieved.

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THE ATTITUDE OF THE PHYSICIAN TOWARD HEALTH INSURANCE.

By A. C. BURNHAM, M. D., New York City.

The subject of health insurance has recently been given wide publicity by the introduction of the Mills bill in the New York Legislature during the session of 1915-16; and this has, in turn, led to the exhaustive inquiry into its advantages and disadvantages by the American Medical Association, which in February, 1916, appointed a Committee on Social Insurance for the study of health insurance, especially in its relation to the medical care of the beneficiaries of the proposed plan.

Dr. Alexander Lambert, of New York City, was appointed chairman of this committee, and in his report,¹ published June 17, gives a comprehensive outline of the present status of health insurance, together with an interesting discussion of the various plans for the administration of the medical benefits.

Dr. Lambert carefully avoids arguments either for or against the policy of health insurance as an additional governmental function, either state or federal; he merely calls attention to the rapid increase in the various forms of social insurance in this country, already including workmen's compensation laws and compensation for occupational diseases, which are apparently only the beginning of legislation on this subject.

THE FIELD FOR HEALTH INSURANCE.

That in general the wage-earner receives inadequate medical care and during illness suffers a disproportionately large economic loss has long been recognized. In 1912 a sickness survey was instituted in Dutchess County, New York, which covered a population of approximately 15,500, and was carried on over a period of 16 months. This survey showed 1,600 cases of sickness that were severe enough to necessitate, or should have necessitated, going to bed or securing medical aid. Minor ailments were not considered. Of these cases, 506 occurred in patients able to secure any desired service, 882 among those able to pay for ordinary service, and 212 among those unable to pay for any service. Adequate service was obtained by 920 cases and inadequate service by 680. Only 55 percent of the cases who remained in their homes throughout their

¹The statistical data and quotations in this article were taken from the report of the Committee on Social Insurance (Jour. Am. Med. Assn., June 17, 1916).

sickness received adequate care, while 80 percent of the hospital cases received adequate care.

TABLE SHOWING CARE RECEIVED BY DIFFERENT CLASSES OF PATIENTS.

Financial condition.	Number of cases.	Medical care received.	
		Adequate, percent.	Inadequate, percent.
Well-to-do.	506	81	19
Moderate means	882	50.5	49.5
Poor.	212	32	68

From the above it is apparent that in 680 cases receiving inadequate care, more than 63 percent were patients who were able to pay ordinary charges, but not for a protracted period.

A somewhat similar investigation in Rochester demonstrated that of 789 cases of sickness, only 50 percent were receiving medical care, while among those cases incapacitated for work only about 64 percent were being treated by physicians or institutions.

An attempt has been made to supply the need for medical care of the poor and persons of moderate means by means of fraternal organizations and commercial industrial insurance. These have both been unsuccessful.

In Dr. Lambert's report he has the following to say regarding the so-called "lodge practice:"

"These lodges are almost invariably run on the system of capitation payment to the physician—that is, so much per head per year. There is competition among poor physicians, themselves struggling to secure several lodges, that they may eke out a meager income, and the commercial haggling by the officers of these lodges bidding down the struggling doctors to a minimum, so that all the evils of the system are brought out in full force. Underpaid physicians, enormously overweighted by large panels of people to take care of, result in inadequate remuneration to the physician and inadequate care to the sick. . . . Compulsory insurance by the state can alone solve these economic problems of the very poor and release the unfortunate physician, who, facing starvation, must accept this lodge practice."

The commercial insurance companies writing industrial insurance, while honestly managed, are able to accomplish little toward invalidity insurance because of the disproportionately large administrative expense. The premiums being small, \$1 to \$2 monthly, must be collected by agents going from house to house. This adds enormously to the expense, so that, according to Charles F. Nesbit, the superintendent of insurance of the District of Columbia, not more than 40 percent of the premiums are paid back to the insured in the shape of benefits. In other words, of \$100,000 collected in premiums, more than \$60,000 is paid for collection, administration expenses, and profits, and only \$40,000 is paid to the insured.

"Because of the inadequacy of control by the companies of their insured people, who are scattered over wide areas, because of the necessities of the manner in which they must carry on their busi-

ness, it is an impossibility, even with the best of intentions, to give an adequate health insurance to the really poor, who are in the greatest need of this protection."

HEALTH INSURANCE IN OTHER COUNTRIES.

Strange as it appears, Russia has the most advanced system for the care of the health of the wage-worker. In Moscow there is a law requiring every factory employing 1,000 workers to establish a hospital containing 10 beds. Outside of the city of Moscow the following regulations, established by the provincial factory commission, are given as a type: "Factories employing 500 or more workmen are required to have a factory hospital with one bed for each 100 workmen, a resident physician, and a medical assistant who is of a higher grade than a trained nurse. When the number of workmen exceeds 3,000, two physicians must be employed, one of whom must reside at the factory. Where 200 or more women are employed, a special maternity room must be provided and also the services of a midwife."

In Germany, sickness insurance was introduced in 1883 and has reached a high degree of development. The responsibility for insurance is placed on the employer, the insurance premiums being paid by contributions divided between the employer and employee, most of the insurance being carried by mutual insurance societies.

In Great Britain the insurance was carried by the so-called Friendly Societies until 1911, when the health insurance law was introduced, which provided for compulsory insurance of practically all employed persons between 16 and 70 years. The weekly insurance rates are 14 cents for men and 12 cents for women, the amount being divided between the employer, the employee, and the government.

Sickness, disablement, and maternity benefits are provided, which include medical attention and a weekly cash benefit during invalidity. In certain cases the insurance has been broadened to include benefits during periods of unemployment. It is estimated that there are approximately 16,000,000 insured persons under the British act.

Similar laws have been passed by Austria and Norway, although, as a whole, they are not so well developed as in Germany and Great Britain.

HEALTH INSURANCE IN AMERICA.

The spread of workmen's compensation laws in the United States has been rapid. During the last year laws have been passed in 10 additional states and territories, making the present total 33 as against 23 a year ago. In Massachusetts a pension law has been recently introduced, and during 1916 bills were introduced in 11 legislatures for the establishment of state-wide health insurance.

At the present time, except for the army and navy and a few other groups of public employees, there is no direct control which provides for or aids health insurance. Indirectly, however, the activities of the various state and municipal boards of health and the medical benefit granted by the public hospitals are measures of medical benefit given to the poor of the locality in which they are situated.

In some cases, as in tuberculosis and some of the communicable diseases, the state or municipality assumes complete control of the management of the disease, even supplying medicines, nursing, and hospital facilities. In New York the health of the children in public schools is supervised, and in some instances diagnosis and treatment are supplied gratis.

Trades unions have initiated a system of health insurance which provides disability and funeral benefits, but, as a rule, make no attempt to furnish medical care. This type of insurance includes approximately 10 percent of the total number of wage-earners.

Employers' organizations have been formed by employers for the benefit of employees, and in a few cases have been highly developed. They are, however, looked on by the employees as a species of charity, and, in general, are apt to lead to dissatisfaction. Lodge insurance and private health insurance have been already mentioned. They are both uneconomic and inadequate.

PLANS FOR HEALTH INSURANCE LAWS.

The American Association for the Advancement of Labor Legislation has formulated a tentative draft of a health insurance act. It aims to give the wage-worker and his family adequate medical care, together with disability and funeral benefits. The medical care is to include maternity and hospital care, with medicines and surgical supplies. The advantages and desirability of such an act may be taken for granted. Its disadvantages, if any, are the result rather of failures of administration rather than of the basic principles of the act.

In Dr. Lambert's report, while it is made plainly evident that he is not arguing either for or against the act, the following is of interest as indicating the general opinions of the committee:

"The effective administration of any health insurance law must be done through limitation, by trade or geographic area, of its application. This is clearly seen in the working of the various laws in the different countries. The English law is difficult of administration because it violates this fact. Germany and Austria show marked effectiveness because their laws follow this peculiarity. Furthermore, the results obtained in working out the details of the law will be greatly influenced by the financial management of it. In Germany the expense borne by each member—the employer, the employee, and the state—is designated in percentage, the actual amounts necessary being left to experience and management to obtain. In England a definite monetary

amount was laid down by law, and, with the errors of actuarial calculation, it has been found that these amounts are insufficient to give the desired results to the workers."

It was found in England that the fixed premium of 18 cents a week was too little for the result desired, and that the inadequate care of the sick and the lack of sufficient medicines tended to prolong the period of disability, while in Germany the more liberal application of the medical benefits resulted in a saving in wages and sick benefits of many times the amount expended for medical care.

It is plainly evident to the careful student of economic progress that health insurance is certain to be introduced into the United States in the comparatively near future. It seems to be the best solution for many problems of ill health, unemployment, and poverty which seem to be inseparably associated with present-day conditions. Whether it will fulfill the sanguine anticipations of those who are unselfishly working for its introduction, or whether its usefulness will be hindered and possibly made ineffective by the conditions peculiar to the American continent, can be demonstrated only by actual trial. All the precedents and theoretical arguments are in its favor, but it has been well demonstrated that, unless carried out in its entirety, health insurance may fall far short of success.

"However one may criticise the details, the insurance act has unquestionably improved the condition of the working classes which have come under the law," says the report of the Committee on Social Insurance.

MIXED AND SECONDARY INFECTIONS IN PULMONARY TUBERCULOSIS AND THE MEASURES PREVENTIVE AND CURATIVE FOR DEALING WITH THEM.

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In pulmonary tuberculosis the exact relation between the primary infection by the tubercle bacillus and the organisms of secondary and mixed infection is difficult to determine. Some investigators consider the tubercle bacillus responsible for all the damage done, and secondary infection of little or no importance; other authors maintain that in a great majority of instances the tubercle bacillus alone is comparatively benign, and pus-producing bacteria are to blame for the destructive changes in chronic ulcerative pulmonary tuberculosis. This disparity in views is clearly shown by the report of the Committee on Mixed Infection of the National Association for the Study and Prevention of Tuberculosis.¹

Of a committee of eight, four² brought in a majority report saying that, in their belief, consumption is due to the combined action of the tubercle bacillus and pyogenic organisms. The remaining three members presented a minority report as follows:

Arnold C. Klebs: "I cannot see the causal correlation between certain symptoms in pulmonary tuberculosis and a 'mixed infection' determined *intra vitam* by methods presently at our command in a majority of cases."

E. S. Bullock: "Many years' experience with tuberculosis has not served to give me any very definite ideas regarding the role of mixed infections. To say just where tuberculosis begins and mixed infection leaves off—that is, granting that such an entity as mixed infection exists, or vice versa—I believe to be impossible in any given case."

There is a large amount of evidence advanced to support each of the several views of the various observers. This evidence, however, is for the most part incomplete and contradictory, and the complexity of the problem is so great that many of the methods which have been employed are of little value in furnishing reliable data. In reviewing the literature, one is impressed with the great variety of conclusions drawn, even by those using the same methods of investigation.

In the past it was unnecessary to know exactly the extent of the mixed infection present, because the treatment, hygienic and dietetic, applied equally as well to a pure tuberculous infection as to a tuberculous infection complicated by other organisms. With the growing popularity, however, of tuberculin and the introduction of autogenous vaccines for the treatment of the secondary in-

fection, it is necessary to determine more accurately the influence of the mixed and secondary infection in order that our specific immunization, both against the primary and secondary or mixed infection, may be logical. In order to be of value, vaccine therapy, in the light of our present knowledge, must be direct and specific; therefore an accurate determination of the organism or group of organisms causing the damage must be made.

In the study of secondary and mixed infections in pulmonary tuberculosis, seven different methods of attack have been employed, namely: (1) the direct observation of clinical phenomena, (2) animal experimentation, (3) bacteriological and anatomical examination of the lung after death, (4) bacteriological study of the sputum, (5) study of the opsonic index, (6) study of the leucocytes, (7) blood cultures.

The study of clinical phenomena is not conclusive. Baumler,³ for instance, believes bronchopneumonia after hemorrhage is caused by secondary infection, while Sörgo⁴ is of the opinion that the tubercle bacillus alone produces bronchitis and pneumonia.

Czaplewski, Ziegler, Maragliano, Weichselbaum, and Strumpell (all cited by Cornet⁵) believe that organisms of secondary infection are responsible for many of the changes found in chronic pulmonary phthisis, and Cornet and Petruschky⁶ are convinced that the steep temperature curve of chronic pulmonary tuberculosis is due to a mixed infection. Cornet has expressed his views as follows: "Because of the atypical course of the disease, the rapid variations in temperature at times, the fact that extensive infiltration often develops in a few days and then disappears after a short period or leaves areas of caseation or softening—which data do not coincide with the characteristics of the tubercle bacillus, slowness of growth and tendency to hold its ground—lead to the idea that other organisms than the tubercle bacillus may be found in the lesions of pulmonary tuberculosis." Rapid emaciation, excessive weakness, cough, profuse expectoration, chills, and sweats are all attributed to the presence of secondary pyogenic organisms; on the other hand, Pick⁷ points out that the intermittent type of fever is often found in cases with only tubercle bacilli in the sputum and no secondary organisms in the tissues after death; and Sörgo⁸ has found individuals with many secondary organisms in the sputum and pronounced cavities that did not show fever, sweats, or emaciation.

The results of experiments on animals have led to directly contradictory results. Cornet⁹ found that rabbits inoculated with sputum of phthisis often died of acute septicemia in a few days, before the tubercle bacilli could have multiplied sufficiently to cause so great an amount of damage. Koch and Gafkey¹⁰ identified the micrococcus tetragenus as an occasional factor in tuberculosis and showed its pathogenicity by animal inoculation. Sternberg and

Pasteur, on the other hand, were both able to produce acute septicemia in animals by the inoculation of normal saliva, and many of the organisms cultivated from washed tubercular sputum have been shown to have little or no virulence (Schroeder and Mennes¹¹) Prudden¹² has found that the inoculation of tubercle bacilli in rabbits seldom caused cavities; the intratracheal injection of streptococci into tuberculous animals, however, caused marked cavity formation. Marmorek,¹³ on the other hand, was able to produce cavities by injecting pure cultures of tubercle bacilli together with large doses of tuberculin.

The evidence contributed by postmortem examination of the lung, both bacteriological and pathological, has been of little value in the study of the problem, because postmortem, agonal, and terminal invasions are such complicating factors. That postmortem invasion is a very important complicating factor in this method of investigation is shown in the report of Ravenel.¹⁴ Norris and Pappenheimer¹⁵ have also pointed out that the secretions of the bronchi during life flow out, but, after death, flow from the upper to the lower respiratory passages. In fact, these authors go so far as to state that bacteriological examination of the lung after death gives no indication whatsoever as to the conditions present during life. Secondary organisms have, however, been described in the walls of cavities, where they have kept pace with the tubercle bacillus, or even preceded it in the invasion of healthy tissue (Hobst, Petruschky, Kossel, Pasquale¹⁶). Kossel and Cornet¹⁶ have both found secondary organisms in tubercles in the liver and spleen in cases dying of pulmonary tuberculosis.

The sputum has been studied extensively, but, again, this method is unreliable. It is a well-known fact that all the organisms present as mixed or secondary infections in pulmonary tuberculosis may also be found in the healthy mouth, pharynx, and trachea. In fact, I have found that smears from the secretions of the pharynx of normal individuals do not differ from smears of tubercular sputum, except in the absence of tubercle bacilli. Flick,¹⁷ examining hemorrhagic sputum, found the pneumococcus present in large numbers in over 60 percent of the cases examined, and concludes that the pneumococcus is of importance in the production of hemorrhage. It is doubtful if these organisms are present normally in the alveoli of the lung.¹⁸

Many investigators have objected to the conclusions drawn from the examination of the unwashed sputum, and have examined the sputum after washing in sterile water or salt solution to free it from organisms collected in the mucus from the bronchi or mouth. Kitasato,¹⁹ Petruschky,²⁰ Schabad,²¹ and Cornet²² have used this method, and agree in designating the streptococcus as the secondary organism most constantly recovered. Sorgo insists that the amount

of washing used by these observers was insufficient, and mixed infection is very uncommon.

Wirths²³ has used the opsonic index. He found the index normal—that is, between .8 and 1.2 in all of his cases to the bacillus subtilis, bacillus coli, pneumobacillus, pseudodiphtheria, micrococcus catarrhalis, micrococcus tetragenus, and diplococcus capsulatus. He found it abnormal (below .8 or above 1.2) in 2 cases out of 17 (12 percent) to the influenza bacillus, in 18 cases out of 24 (75 percent) to the pneumococcus, and in 6 out of 19 cases (30 percent) to the streptococcus.

I have examined the opsonic index to the streptococcus, pneumococcus, and staphylococcus in 40 cases of pulmonary tuberculosis, and have found the index to all of them between .8 and 1.2 in all cases but one, and in this case the index to the staphylococcus aureus was .75. This case was complicated by a rectal sinus, and a bacteriological examination of this sinus revealed staphylococci. In several of the cases examined by this method blood cultures were made (the technic used will be described in a succeeding paragraph), and streptococci or pneumococci isolated in pure culture. Gram positive cocci were also found in blood smears in several of the patients examined. The usual Wright technic was used in the determination of the opsonic index on serums one or two days old, and, as in Wirths' work, heterologous strains were used; and from these results I have come to the conclusion that the opsonic index, in my hands at least, used in conjunction with heterologous strains of streptococci, pneumococci, and staphylococci, is not an accurate method of determining the influence of the secondary or mixed infection on pulmonary tuberculosis.

Other methods of serum diagnosis have, as yet, proved of little value. I have examined the bactericidal action of the serum of patients showing the clinical symptoms of mixed infection—intermittent temperature, chills, sweats, and profuse expectoration—in sixteen instances on heterologous streptococci and pneumococci, and the number of colonies developing on the plates in which patients' serum was used was approximately the same as in the control plates.

The agglutination reaction was tried in six instances with no results whatsoever. Complement deviation has not been of any assistance. Leukocytosis in pulmonary tuberculosis has been employed as a criterion indicative of a mixed infection (Simon²⁴), inasmuch as the tubercle bacillus alone, except in acute miliary tuberculosis, does not produce a leukocytosis. "In pulmonary tuberculosis an increase in leukocytes is usually referable to suppurating cavities, advancing pneumonia, severe anemia, or hemoptysis" (Ewing).

"As long as the infection is a purely tuberculous one, even if it

is acute, the white cells are unaffected, the leukocytosis of the third stage being evidence of the development of a mixed infection" (Limbeck).

Ullom and Craig²⁵ have made leukocyte counts on 39 cases, and have found an average of 10,285 white cells in cases in the first stage, 12,772 in second stage cases, and 14,041 in cases in the third stage. I have made blood counts on 112 cases with the following results:

TABLE I.

Classification.	Number cases Examined.	Average leukocyte count.	Number cases showing leukocytosis.
Incipient.	16	11,963	11
Advanced.	84	14,783	57
Far advanced	12	15,820	10

It is known that pyogenic organisms cause a leukocytosis and that the increase in leukocytes in pyogenic infection is largely due to the neutrophilic polymorphonuclear cells. The leukocytosis encountered in my cases was usually due to an increase in the neutrophils, as is seen by an examination of the accompanying table.

TABLE II.

No.	Class.	Total leukocyte count.	Large mononu- clears, percent.	Small mononu- clears, percent.	Neutro- philes, percent.	Eosino- philes, percent.	Mast cells.
1	Advanced active..	13,300	7	2	90	2	
2	Advanced passive.	8,300	7	2	90	1	
3	Advanced passive.	7,300	6	10	80	3	1
4	Advanced passive.	11,500	5	6	87	2	
5	Advanced passive.	11,500	15	8	76	1	
6	Advanced passive.	11,200	5	1	88	1	
7	Advanced active..	17,600	10	4	85	1	
8	Advanced passive.	8,500	11	16	79	3	
9	Far advanced active	11,000	15	7	76	2	
10	Advanced passive.	9,480			87	0	
11	Advanced passive.	8,800	8	5	87		
12	Advanced passive.	11,000	5	3	90	2	
13	Advanced active..	8,000	7	2	90	1	
14	Advanced passive.	9,500	5	1	88	1	
15	Advanced active..	11,600	11	14	68	4	1.5
16	Advanced active..	7,500	7	10	82	1	
17	Advanced passive.	15,400	9	10	79	2	
18	Incipient passive.	18,100	10	10	79	1	
19	Incipient passive.	8,100	8	7	84	1	
20	Advanced active..	11,000	12	17	66	3	2
21	Advanced active..	9,440	9	7	81	2	1
22	Advanced active..	12,000	11	15	71	3	
23	Far advanced active	12,800	8	11	80	1	
24	Advanced active..	14,600	14	7	76	2	1
25	Incipient passive.	9,250	12	15	73	1	
26	Advanced active..	11,000	12	17	83	2	
27	Advanced passive.	13,500	10	9	80	1	
28	Incipient passive.	9,100					

A low-grade leukocytosis in chronic pulmonary phthisis, especially in the moderately advanced and advanced cases, is the rule rather than the exception. A definite pyogenic infection may, however, be present without producing a leukocytosis, and, even though a definite leukocytosis is present, the character and location of the secondary invading organism is not revealed.

Blood cultures have also been used extensively in the study of this problem. It is generally conceded that the blood or tissues of the body not in contact with the outside air, under normal conditions, is sterile, and finding bacteria in the blood under any conditions is indicative of a pathological condition. If it is possible to recover organisms of mixed infection from the blood in tuberculous individuals, it is evident that this mixed infection is, pathologically, of significance. Therefore blood cultures have been repeatedly employed in attempts to show the presence or absence of such a bacteremia, and direct contradictory results have followed the employment of this method of study. Blood cultures made after death are not convincing because terminal, agonal, and postmortem invasion are such important factors. Early workers, making blood cultures during life, obtained a high percentage of positive results. They secured the blood by pricking the finger or ear, and allowing the blood to fall through the air into culture media. By this method, of course, the number of contaminations from skin and air was very high, and the number of staphylococci (chiefly albus) reported indicates that the large percentage of their positive findings was due to such contaminations. Therefore the results of these early investigations can be disregarded.

Later workers, using more exact bacteriological methods, drawing a large volume of blood directly from a vein under modern aseptic conditions, have shown a very low percentage of positive results, especially in the recovery of streptococci or pneumococci. Twenty-one authors²⁶⁻⁴⁶ using venous puncture in the examination of 1,151 cases, obtained only 31 positive blood cultures for the streptococcus or pneumococcus, or 2.7 percent positive results. In the employment, however, of this method in the study of a problem of this character, it is obvious that the evidence furnished by positive results far outweighs that furnished by negative results.

From the results above cited, Jochman, Reiche, Benohr, and others have concluded that, if mixed infection is responsible for chills, night sweats, irregular fever, and emaciation in pulmonary tuberculosis, the action is due to soluble toxins thrown into the circulation from an area of localized infection rather than a general bacteremia.

The results of workers using modern blood culture methods, as above shown, were uniformly negative, and their conclusions seem justified, but a historical review of blood culture examinations in other diseases, such as typhoid or pneumonia, show that, with the development of more careful methods, there is a marked increase in the percentage of positive blood cultures.

Because of the possibility that the negative results of previous workers may have been due to inefficient technic, and because of the conclusive character of the evidence furnished by positive blood

cultures obtained during life, I decided to use this method of attack in the study of the problem.

This work was begun in 1910, and in November, 1911, the results of the examination of 130 cases of pulmonary tuberculosis were published in the *Journal of Infectious Diseases*.⁴⁷ The technic used at that time is given in detail in the report above cited, but briefly was as follows:

The blood, 15 to 20 c.c., was aspirated directly from an arm vein by means of a glass aspirating bulb of 25 c.c. capacity. Cultures were made in agar and broth, and in many instances a small portion of the undiluted blood was cultivated in the sterile aspirator or a sterile test tube. The blood agar and broth cultures were examined daily, and in the case of positive results transfers and subcultures were made on blood agar, plain agar, potato, gelatin, milk, broth, serum-inulin water or serum-inulin agar, and cultural and microscopical study was carried out in each instance until the identity of the fully isolated organism was established. In all instances the organisms were streptococci, pneumococci, or staphylococci.

All organisms showing the usual characteristics of the staphylococcus were discarded as possible skin contaminations; hence the results recorded as actual positive blood cultures have to do only with streptococci and pneumococci. On this basis alone, however, positive results were obtained in 60 or 46 percent. Streptococci were found in 36 cases and pneumococci in 24 cases.

In 1913, in a report to the National Association for the Study and Prevention of Tuberculosis, Dr. Laurason Brown and Mr. S. A. Petroff, at the Adirondack Cottage Sanatorium, Saranac Lake, N. Y., using a technic similar to my own, fully confirmed my findings by a study of 157 cases.⁴⁸ They found pyogenic organisms present in the blood of 9 percent. of incipient cases examined, 24 percent of the moderately advanced, and 61 percent of the far advanced cases.

Avery and Lyall,⁴⁹ in the examination of 110 cases, were able to isolate streptococci or pneumococci from the blood in no instance. A comparatively small amount of blood was drawn (10 c.c.), and only one agar plate and one bouillon flask was used in each case. Using this technic, Lyall was able to isolate pneumococci from the blood in only 40.5 percent of 42 cases of lobar pneumonia. Many authors report 95 to 98 percent positive blood cultures in pneumonia. Evidently their technic was inadequate. Rogers,⁵⁰ examined 119 cases and got fourteen positive results.

As previously stated, success or failure in blood culture examinations, however, depends very largely on technic, and the evidence furnished by positive results far outweighs that furnished by negative results.

More recently Rosenow⁵¹ has shown the importance of oxygen in

the growth of streptococci and pneumococci (a factor not taken into consideration in these former studies of mixed and secondary infection), and he has elaborated a blood culture technic in which this factor is controlled. The technic is as follows:

From 15 to 20 c.c. of blood is aspirated into sufficient sodium citrate solution to prevent clotting. The decalcified blood is then transferred to approximately 200 c.c. sterile distilled water. The distilled water dissolves the hemoglobin out of the blood corpuscles. The hemolysed blood is then centrifuged at high speed for 20 to 40 minutes and the hemoglobin containing water is poured off. The sediment is emulsified in approximately 5 c.c. of sterile normal salt solution, and from this anaerobic and aerobic cultures made in blood agar, dextrose ascites agar, dextrose ascites broth, Loeffler's blood serum, and plain agar. Aerobic and anaerobic blood agar plate cultures are also made. The cultures are followed out for two weeks.

Using this method in a variety of conditions, Rosenow has obtained positive cultures when the usual method has failed. Because of the importance of his findings, it was decided to check up his method against the method previously used in the study of mixed infection. In order to do this, instead of drawing 20 c.c. of blood from the arm vein, 40 to 50 c.c. were taken, and half of this was planted as usual and half according to Rosenow's method. Eighteen cases were studied. No particular effort was made in the selection of cases, as the purpose of the study was the comparison of blood culture methods rather than the determination of the percentage of positive results. In the eighteen cases studied the method previously employed yielded two positive results, while by Rosenow's method eight positive results were obtained; or, in other words, for the cases studied, Rosenow's method was four times as effective. From these results it is reasonable to assume that many of the negative cases reported in my former series were due to inadequacy in technic, and that secondary infection is of even greater importance than previously shown.

The treatment of secondary and mixed infection in pulmonary tuberculosis, until within the past few years, has been very largely symptomatic. The symptomatic treatment of these infections can be dismissed with a few words. High and irregular fever, chills, sweats, profuse expectoration, and emaciation are the symptoms usually attributed to mixed and secondary infection. Many antipyretics have been used in pulmonary tuberculosis; none should be given until the temperature reaches 102° F. For temperatures less than this, rest in bed without medication. Sweats are treated by rest and atropin. Profuse expectoration can be controlled by sedative cough mixtures, but, as a general rule, I am opposed to their use.

Symptomatic treatment, at best, is indirect and unsatisfactory,

and, with the increase in our knowledge of the subject, efficient direct treatment has been the ideal towards which investigators have been striving.

Direct methods of treatment can be divided into two groups: (1) chemical therapy and (2) immunization. The chemical treatment may be (a) antiseptic or (b) drugs that produce leukocytosis. Immunization may be (a) passive—the so-called serum therapy—or (b) active—the so-called vaccine therapy.

The various drugs that have been used because of their antiseptic effect need only to be mentioned—the inhalation and injection of many antiseptic substances, such as colloidal silver and iodoform, iodine and iodoform combinations are now recognized, as far as they exert any specific action, as valueless.

Creosote and its derivatives—guaiacol, creosote carbonate, and other similar substances—have also been employed. They have never been proved to exert any action whatsoever upon the organism present, but seem to have a stimulating effect upon the bronchial mucous membrane during their excretion through it. For this effect, only small doses are necessary in a majority of cases—3 to 5 minims of pure beechwood creosote or creosotal, three times a day, for several weeks are usually employed. They are objectionable because of their effect on the stomach.

The most common drugs administered for the purpose of inducing a leukocytosis are nuclein and cinnamic acid. I have had no experience in this sort of therapy, but Brown has found that, among 28 papers by different observers, 8 were unfavorable, 7 were doubtful as to results, 9 noted an improvement in symptoms, and 4 reported an improvement in the tuberculous condition.

Turning to direct treatment by immunization, passive immunity, or the employment of the various streptolytic, pneumolytic, and other bacteriolytic sera, these have not been productive of definite decisive results.

With regard to the use of various antistreptococcus sera in the treatment of mixed and secondary infection in pulmonary tuberculosis, one or two writers have reported favorable results, but the results achieved in the definitely determined streptococcus infections, such as erysipelas and puerperal fever, and my own observations on their use in cases of pulmonary tuberculosis with marked fever, lead me to the conclusion that antistreptococcus serum, as it is now prepared, is of little or no value as a therapeutic agent.

The principle of bacteriolysis as a therapeutic measure I believe to be a correct one, but as yet we have not determined a successful method of applying it. The following factors may be responsible for their failure.

1. The antibody content per unit volume of the serum may be too low; the methods of standardization are very inaccurate.

2. The variability in strains of streptococci.
3. The rapid multiplication of the organisms. Anything short of a *therapia sterilans magna* may be futile.
4. The complement content of serum of the infected individual may be low.

By overcoming these obstacles, an efficient serum may be produced. My experience with the commercial antistreptococcus serum has not been satisfactory. Ten cases were studied. These were all fever cases, with a temperature of 100° F. to 102° F. each afternoon. These cases were kept in bed with absolute quiet for ten days before the serum was administered; the serum was administered every three days for twelve days and in 10-c.c. doses—40 c.c. to each patient—and they were kept in bed for ten days following the serum treatment. The period of observation in each case was approximately one month. The average afternoon temperature of these ten cases for ten days before the administration of the serum was 100.6° F. The average afternoon temperature during the administration of the antistreptococcus serum was 100.8° F. The average afternoon temperature during the ten days following the serum treatment was 100.4° F. There was no improvement in the general condition of the patients that could be attributed to the serum treatment and from these observations I have come to the conclusion that antistreptococcus serum, in my hands at least, is of little value in the treatment of mixed and secondary infection in pulmonary tuberculosis.

The remaining topic to be considered is active immunization, or vaccine therapy, in the treatment—preventive and curative—of mixed and secondary infections in pulmonary tuberculosis.

As shown in the first part of this paper, mixed and secondary infections are undoubtedly important factors in pulmonary tuberculosis, and pyogenic cocci are known to be more active in tissue destruction than the tubercle bacillus in a majority of cases (Prudden).⁵² Theoretically, protective inoculations against these secondary invaders should be of value in checking the progress of the disease.

Abundant proof of the efficacy of active immunization is furnished by Pasteur's inoculations in chicken cholera, anthrax, and hydrophobia, Jennerian vaccination, and the antityphoid inoculation results of Wright⁵³ and others.

The data on protective inoculations against pyogenic infections are very meagre, but the results that have been obtained in the therapeutic inoculations against the gonococcus, streptococcus, staphylococcus, pneumococcus, etc., especially in chronic subacute and mildly acute localized infections, seem to show that injections of killed organisms hasten recovery and protect against relapse. With regard to protection against mixed and secondary infections

in pulmonary tuberculosis, Webb⁵⁴ has observed a protection against influenza in cases inoculated with the killed organisms. Five patients inoculated against influenza with their own organisms and eight inoculated against influenza with stock vaccines, all giving histories of repeated former attacks, escaped an epidemic of influenza. Preventive inoculations were not given in 32 cases, the patients denying that they had ever had influenza, and 15 succumbed to the epidemic.

Brown, Heise, and Petroff⁵⁵ prepared a mixed polyvalent stock vaccine composed of organisms isolated from cases of coryza, complicating pulmonary tuberculosis. The organisms present in the mixture were staphylococcus aureus, albus, and citreus, streptococcus pyogenes, pneumococcus, bacillus mucosus capsulatus, micrococcus catarrhalis, and streptococcus mucosus capsulatus. This vaccine had little or no effect in protecting patients against coryza as compared with control cases. In 51 cases autogenous vaccines were prepared from washed sputum. In 18 (35 percent) there was apparent improvement, in 24 (47 percent) no change, and in 9 (18 percent) the results were doubtful. Two cases were possibly harmed by the vaccines, and a few cases were strikingly benefited.

I have used autogenous vaccines prepared from both sputum and from organisms isolated from the blood stream in more than 150 cases, and have noted decisive improvement in only a few cases, and in these cases I have not been sure the results were due to the vaccine. In pulmonary tuberculosis the course of the disease is so irregular, and extends over such a long period of time, it is very hard to determine the value of any therapy. Many cases not receiving autogenous vaccines have made remarkable recoveries and others have progressed rapidly to death. The same is true of cases receiving specific treatment, and, in an institution where a comparatively large number of cases have been treated by the hygienic-dietetic method alone simultaneously with cases receiving in addition autogenous vaccines, the difference in the progression of the disease in the two groups has not been great enough to furnish any definite clinical evidence as to their value or lack of value. Autogenous vaccines may or may not exert a favorable influence on the course of pulmonary tuberculosis, but the results achieved are not striking, and, as in the case of tuberculin, a large number of cases must be followed up for a number of years before any conclusion can be drawn.

From these studies, I am, however, convinced mixed and secondary infection play an important role in the production of symptoms in a majority of active cases of pulmonary tuberculosis, and therefore, in seeking for new and better methods of treatment, the attack should be directed against the pus-producing bacteria as well as against the tubercle bacillus, and, with the perfection of an ef-

ficient treatment for mixed infection, a marked advance in the treatment of pulmonary tuberculosis will have been made.

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LUMPS IN THE NECK, WITH SPECIAL REFERENCE TO TUBERCULOUS CERVICAL ADENITIS.

By JOHN B. HAWES, M. D., Boston.

There is probably no condition which the average practitioner is called on to diagnose and treat more often than lumps in the neck. These lumps are usually due to enlarged cervical glands. Successful treatment depends so entirely on correct diagnosis that an intimate knowledge of the various conditions which may cause such lumps or enlargement of these glands is essential. I shall not consider in this article the rarer tumors that may occur in this region, such as branchial cysts and others, nor any form of enlargement of the thyroid gland. The differential diagnosis of the following conditions will be taken up:

Enlarged glands due to

1. Chronic inflammatory processes.
2. Syphilis.
3. Carcinoma.
4. Sarcoma, malignant lymphoma or Hodgkin's disease.
5. Leukemia.
6. Tuberculosis.

The more striking characteristics of each of these on which diagnosis depends are roughly as follows:

1. *Enlarged glands due to a chronic inflammatory process.* The cause of such enlarged glands is usually evident. Among such there may be carious teeth, diseased tonsils or adenoids, pediculi capitis, running ears, etc. The sudden appearance of these glands and their tendency to subside with equal rapidity when the cause is removed are striking characteristics. They are apt to be associated with acute infectious conditions, such as tonsillitis, measles, scarlet fever, etc. It must not be forgotten, however, that the presence of some perfectly adequate cause to explain the enlargement of the glands does not entirely rule out the possibility that these glands may be tuberculous in addition to their being of inflammatory origin as far as the acute symptoms are concerned.

2. *Syphilis.* Lumps in the neck, or ulcerative processes owing to the breaking down of syphilitic gummata, may be easy or difficult to diagnose. In some cases there is a history ofluetice infection and signs of syphilis elsewhere. The Wassermann test may or may not be positive. Ulcers due to syphilis do not react to ordinary methods of treatment, but respond quickly to antiluetic measures. In my own work, I must admit that I have very rarely,

if ever, made the diagnosis of syphilis in such cases at first, but have come to this diagnosis by elimination of other causes—by the failure of the patient to react to tuberculin, hygiene, and proper surgery—and finally have had my diagnosis confirmed by the quick disappearance of the lumps and the healing of ulcers under mercury and potassium iodide.

3. *Carcinoma*. Lumps in the neck due to carcinoma are rarely primary, but are usually metastases from a primary focus in the lip, mouth, tongue, esophagus, and breast. Such glands are hard, and are apt to be discrete and fairly movable. They do not tend to break down until late in the disease. The diagnosis may be only too evident from the discovery of the primary focus. If it is not clear, one should excise a gland and establish the diagnosis by pathological examination rather than wait until further symptoms develop.

4. *Sarcoma, malignant lymphoma, or Hodgkin's disease*. In certain cases the diagnosis of this condition is at first an impossible one to make. There may be a few glands in the neck and none elsewhere, and absolutely no symptoms—constitutional or local. The glands themselves are apt to be soft, elastic, and "juicy," usually discrete, rarely matted together, and do not tend to break down. Careful examination in most cases will reveal a few glands of similar type elsewhere—in the axillæ or groins. The spleen may or may not be enlarged. In my own work, after a fairly large experience during the past ten years with cases of tuberculous cervical adenitis, I must admit that my diagnosis of cases of this sort, where there are no glands elsewhere and where the patient is apparently in perfect general health, is based on very slender evidence, and more on what is called a "hunch" than anything else. In one case of this sort the patient, a young college girl, had been under treatment with tuberculin for two or three months without benefit when she came to me. This fact, of course, made the diagnosis easier. In all cases where there is doubt the gland should be excised and examined microscopically by a competent pathologist.

5. *Leukemia*. Here, in the great majority of cases, an examination of the blood will give the correct diagnosis at once. In addition to this there is generally some enlargement of the spleen and of the glands elsewhere. Development of anemia and constitutional symptoms will help to clear up the diagnosis.

6. *Tuberculosis*. Enlargement of the cervical glands due to tuberculosis is so excessively common that it is fairly safe to consider all such processes as due to a tuberculous infection unless the contrary is evident. There may or may not be marked constitutional symptoms. Similarly, there may or may not be a definite source of infection in the teeth, tonsils, adenoids, or elsewhere. Tuberculosis may cause enlargement of the cervical glands at any age and at any time. They may come rapidly without apparent cause, or they may come on gradually and last for years. Some of them tend to

break down, while others do not. Some are discrete and elastic, and others are hard and matted together. There may be signs of tuberculosis in the lungs or elsewhere, but usually such signs are lacking. The ultimate test in diagnosis is to excise the gland and to examine it microscopically. As I said before, when in doubt it is better to call such a process tuberculous and to treat it as such until symptoms develop which show that it is due to something else. In distinguishing such glands due to tuberculosis from those due to simple inflammatory processes, I make an arbitrary rule that, whenever such glands have lasted more than three months in the absence of obvious cause, they are probably tuberculous by that time, even if they were not in the beginning, and that it is better to treat them as such.

The treatment of these lumps in the neck naturally varies according to the cause. In all these conditions there are two methods of treatment, depending on the diagnosis. The first consists of treating the lump in the neck, and the second consists of treating the patient who happens to have the lump in the neck. In general, the treatment of these enlarged glands may be summarized as follows:

1. The treatment of glands due to chronic inflammatory processes is simple, and consists in removing the cause.

2. Syphilitic tumors or ulcers are likewise most amenable to treatment under antiluetic measures, once the diagnosis is made.

3. Carcinoma of the neck, whether primary or secondary, naturally presents a more or less hopeless problem. The primary focus as well as the glands should be removed if possible. In far too many instances, treatment is of no avail, although x-ray and radium therapy may prolong life.

4. Sarcoma, malignant lymphoma, or Hodgkin's disease. The outlook is about the same here as with carcinoma. In these cases a correct diagnosis is essential because, although an absolute cure is improbable, persistent radium or x-ray treatment under competent supervision may prolong life for years.

5. Leukemia. Here radium and x-ray treatment may be of great help. In the majority of cases, however, treatment consists in making the patient as comfortable as possible.

6. The treatment of tuberculous cervical adenitis has undergone marked changes during the past five or ten years. Up to the year 1905, and in some places very much later than this, even up to the present time, the treatment of tuberculosis of the glands of the neck was looked on as one wholly and entirely belonging to the surgeon. A curious distinction was made, which I have never been able to understand, between tuberculosis of the lungs, where it was the patient himself who was put under treatment and given the fresh air, rest, and proper food, on which the cure of tuberculosis is known to rest, and those cases where the tuberculosis was not in

the lungs, but was in the glands of the neck. Here the patient himself was apt to be entirely disregarded, while the surgeon devoted his attention to the lumps in the neck, and endeavored by surgical measures—sometimes well, but far too often badly done—to remove the glands and to bring about what he hoped would be a cure. Such “cures” were generally very temporary ones. In the records of any large hospital will be seen reports of case after case operated on for “the radical removal of tuberculous glands of the neck” and discharged as “cured.” If the subsequent history of many of these patients were followed, and at the Massachusetts General Hospital I have had an opportunity of personally looking up many such histories, it would be found that a large proportion were not radically cured or cured in any sense of the word, but returned to the dispensary or out-patient department in a few months or years, or went to some other hospital, for further operation for the recurrence of the glands.

The routine procedure which I endeavor to have carried out in every one of these cases which comes to my clinic at the Massachusetts General Hospital, or to me in private practice, is somewhat as follows:

First, find and, if possible, remove all sources of infection. This means a careful examination of the teeth, by x-ray if necessary, to reveal any hidden collection of pus around the roots, examination of the tonsils and adenoids, if present, and their removal if necessary, as well as a careful search elsewhere for any infectious focus.

Second, operative measures.

In regard to surgical procedures, an operation may or may not be necessary, depending on

1. The size of the glands involved, whether they are discrete and easy to be removed, or whether they consist of masses matted together and presenting a surgical problem of great difficulties.

2. Whether the general condition of the patient warrants an immediate operation, or whether, as is often the case, it is not better to remove the foci of infection and to build up the patient's general health before operating.

3. Whether the glands have broken down and begun to suppurate. If this is the case, an operation under local anesthesia, consisting of a simple small incision large enough to allow of free drainage, but with no attempt to do anything radical, should be done, and the sooner the better.

4. Whether the standard of surgical skill available for the individual patient is a sufficiently high one. In far too many cases an operation for the removal of glands of the neck is looked on as an easy and simple operation. My own experience makes me firmly convinced that it requires mature judgment, great technical skill, and long experience to do good surgery in such cases.

5. Finally, my decision as to whether I should call in a surgeon

would depend on the finances and on the intelligence of the patient. If it were no hardship for the patient to undergo the longer period of treatment by general hygienic measures, tuberculin, etc., in the great majority of cases I should advise this. In justice to the surgeon whom I should select to do an operation, should one become necessary, as well as to the patient, the surgeon should see the case at the beginning and be kept in touch with the patient afterward. In many cases I have advised an immediate operation among workmen and women when I knew it could be skilfully done, simply because it took less time and in the long run cost less money than slower and more conservative though perhaps safer methods.

Third, general hygienic measures. The question as to how much each patient needs in the way of improved hygiene, fresh air, rest, etc., must naturally depend almost entirely on the individual case. Many of my patients, particularly among the children, are apparently in the most splendid health, and it seems absurd to demand increased or better food or any radical changes in their methods of living. Heliotherapy, or sunlight treatment, where it is possible to carry it out successfully, I believe to be of the greatest benefit in all cases. In Massachusetts, at least—the New England climate especially in the winter time—practically rules this out. Outdoor sleeping is of great help when it is not a hardship. Four or five glasses of milk in addition to three good meals a day is all I ever demand in the way of increased food. A cool sponge bath down to the waist every morning is beneficial. Sundays, Saturday afternoons, and holidays should be spent in the open—out of town if possible. Plenty of sleep with windows open, when outdoor sleeping is impossible, is essential.

Fourth, tuberculin. During the past ten years at the Massachusetts General Hospital I have had under my care nearly 500 cases of tuberculous cervical adenitis, and have used tuberculin in practically all. I can, at least, say with absolute certainty that in no instance has tuberculin done any harm. In a few instances I have been unable to see that it has done much, if any, good; in a large number I am willing to go so far as to say that *I believe* tuberculin has been a factor in the resulting improvement, while in a small carefully selected group of cases I can go still further and say that I am certain tuberculin has been the principal and main factor in the patient's recovery. I do not wish to be considered a "tuberculin enthusiast." If I had to drop any one of the four factors in the treatment of these conditions—elimination of sources of infection, hygiene, surgery, and tuberculin—I should prefer to do without the tuberculin first and surgery second, though it would be a close decision between these two. Likewise, I do not believe that tuberculin should be used by the general practitioner or surgeon. It should be kept in the hands of those who, from long experience and careful study, know its dangers and limitation as well as its value.

A CASE OF MYELITIS ASSOCIATED WITH THE BLOOD PICTURE OF ACUTE LEUKEMIA.¹

By SIDNEY I. SCHWAB, M. D., St. Louis; LLEWELLYN SALE, M. D., St. Louis, and ERWIN R. SCHMIDT, M. D., St. Louis.

The following case is deemed worthy of report on account of the unusual association between acute myelitis and acute leukemia, and because it was possible to observe the beginning of an acute leukemia during the course of a myelitis and to follow it by a study of the blood until the patient's death. It is further of importance as a contribution to the possible etiology of leukemia, and as an opportunity to bring to the attention of other investigators the possibility of the causal relation between acute spinal cord processes of an infectious nature and leukemia. The paper naturally falls into four parts:

1. An account of the original myelitic process.
2. The rise and development of the leukemic process.
3. A study of the blood.
4. A consideration of the literature.

This patient, a man aged 50, married, was first seen in consultation with Dr. Singer on June 27, 1916. He was transferred to the Barnes Hospital on that date for further study. The history obtained at that time, with subsequent additions that seemed to be important, is about as follows:

The patient was in business in a small way, and, up to about four weeks before present illness, seemed to be in his usual health. About this time, after supper, he experienced a severe burning pain in the small of his back, which compelled him to walk the floor for relief. The pain increased in severity, and a physician was called, who gave him some tablets. These tablets apparently relieved his pain, but in the morning he complained of a dead feeling in both legs. This became so bad that he was compelled to use a cane in walking about, and very gradually, in the next three weeks, he lost the use of his legs until, when seen for the first time, he was completely bed-ridden and unable to move his legs or to get about. At the time he was first seen he had lost control of his bladder and rectal reflexes. His subjective complaint was a dead feeling, extending well up to his chest, the exact line of which the patient could describe.

On admission to the Barnes Hospital on June 27, 1916, he was

¹The bibliography for this article has been collected since 1903, but is not printed herewith.

found to be completely paraplegic, incontinent, with distended abdomen, complaining of a burning sensation between the shoulders, and the dead feeling referred to, which extended as far as the fifth dorsal segment. He further complained of a dead, heavy feeling

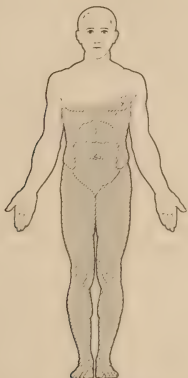


Fig. 1.—Sensory examination, July 7, 1916.



Fig. 2.—Sensory examination, June 17, 1916.



Fig. 3.—Sensory examination, June 28, 1916.

in his chest, and of general weakness and discomfort. He was irritable, restless, anxious, and distinctly aware of his condition and its serious import.

There is nothing in the past or family history which throws any

light on the present condition. He is the father of numerous children, all in fair health. There is no history of traumatism or of unusual or sustained effort or exposure to heat, cold, or wet. The only incident, a purely emotional one, which could in any way be associated with his present condition was the sudden death of his youngest child from what was at first said to have been epidemic cerebrospinal meningitis. Subsequently this was found to be an error, the child having probably died from a gastrointestinal attack. Patient's habits are good. No history of alcohol or tobacco used in excess. No history of venereal disease. The summary outlined suggests the usual story of a hardworking, abstemious Russian Jew, the father of a large family, active in a small business way, successful as far as taking care of his children and providing for them according to his means. He cannot be said to have been an unusually hard worker, nor was his work, that of a small storekeeper, such as to put on him a severe burden.

A brief summary of his physical and neurological status at entrance is as follows:

A small, fairly developed man, looking his age, with good color, anxious expression, restless, expectant. No cranial nerve involvement. Pupils are normal in every way. Head is freely movable without pain or discomfort. Respiratory movements normal in rhythm. Diaphragm is observed to move with inspiration and expiration, and abdominal muscles take part in respiratory movements. The apical impulse is in the fourth interspace, somewhat difficult to feel. The heart is evidently not enlarged. Pulse is regular, about 80. Nothing unusual in the cardiovascular system is observed. The urine, although patient had been catheterized several times in the preceding twenty-four hours, showed at this time nothing abnormal. Abdomen was distended, tympanitic. There was a condition of semipriapism.

The neurological examination showed a complete flaccid paraplegia, in which there was no trace of voluntary movement in the legs. No single muscle or muscle group in the legs was capable of the slightest voluntary innervation. Both legs fell flaccid when raised from the bed. There is not the slightest power of inward or outward rotation at the hip. There is complete abolition of all deep and superficial reflexes of the legs. No Babinski; in fact, no response to any form of stimulus. There is complete sensory anesthesia to all forms of sensory stimuli up to the level indicated in the diagram (Fig. 1)—that is, about the fifth dorsal segment.

A lumbar puncture was done immediately on entrance to the hospital, and a bloody fluid dripped from the needle very slowly. The results of the examination of this blood will be described later. The patient now began to complain of burning sensations in the arms, especially over the triceps.

The following interpretative note on the data obtained was made on June 28—that is, two days after entrance:

There is a definite increasing weakness of hand and arms and fairly well localized parasthetic sensation in both arms. Sensorium

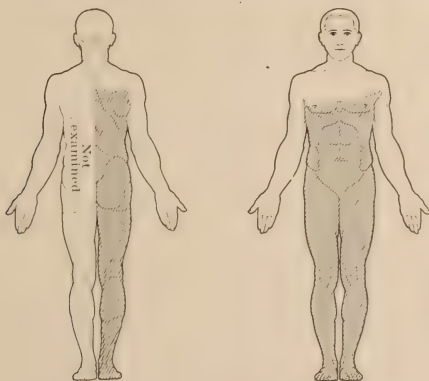


Fig. 4.—Sensory examination, July 27, 1916.

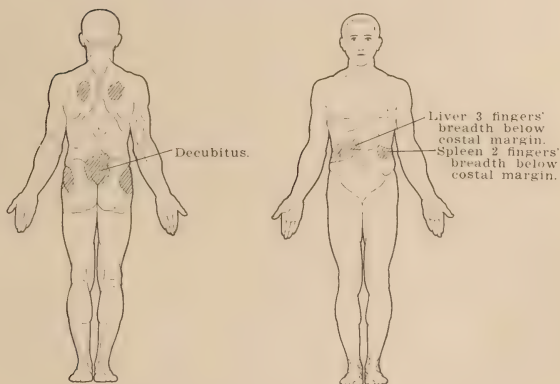


Fig. 5.—Leukemic hemorrhages, July 30, 1916.

is still clear, but patient is anxious and fearful. There is an easily produced fatigue of the bulbar mechanism when attempts at swallowing and talking are made. The case presents the picture of a progressive myelitic process, involving the whole extent of the cord

up to the fifth dorsal segment. This process is infectious and of unknown origin.

The other possibilities to be considered are cord tumor or abscess, Pott's disease, syphilitic meningomyelitis. Sensory examinations made daily, as a matter of routine, showed no marked change from the initial chart. A second lumbar puncture gave the same kind of fluid obtained at the first puncture. This fluid was interpreted as a transudate, due to the edematous condition of the cord. The cell count of the second fluid was 93 polymorphonuclears and 3 lymphocytes. The two spinal fluid specimens, together with the two blood serums, gave negative Wassermanns. Both blood cultures were found likewise to be negative. Numerous x-ray studies of the spine were made, with negative results. Surgical and orthopedic consultations excluded acute Pott's disease, and any surgical interference was felt to be out of the question. Ophthalmoscopic examination was found to be normal.

In the early days of the myelitic process there were frequent, but moderate, rises of temperature. At one time as high as 104° F. was reached. With the decline of the temperature at the end of the first week a surprising lowering of the pulse rate was observed, the pulse remaining at about 50 and under for two weeks. A cardiographic study made at this time was entirely without result, and gave no explanation of the slow pulse. It was assumed that the bradycardia was due to an irritative process, involving some of the descending vagal fibers in the cervical cord.

The sensory test showed no change from entrance, and tuning fork test showed constant absence of vibratory sensation. Deep pressure, joint sense and muscle sense were continuously lost.

On July 5 the third lumbar puncture was made, and fluid of the same character was obtained. A typical sacral bed sore was gradually developing. Cultures were taken from the bed sore, which showed growth of staphylococcus. Notes made daily showed the usual progress of a myelitic patient, with slight rise of temperature, developing decubitis, slight leucocytosis. On July 15 a systolic murmur was heard for the first time.

The progress of the case continued in this way until July 23, when patient had his first chill, succeeded by a temperature of 105° F. At this time the blood studies began to be of so much interest that the myelitic process became of secondary interest, and our entire attention was focused on the study of the leukocytosis and the morphology of the stained blood specimens.

On July 24 patient had a violent chill, temperature reaching 105.6° F. at 9 p. m. The leukocytosis was 38,500. A stained specimen of blood was made with the idea of finding a malarial infection, as the temperature was considered too high to be explained by the toxic absorption from the bed sore. The blood showed no or-

ganisms, but did show a predominance of large granular mononuclear cells, which were larger than the small and large leukocytes. At this time the possibility of a leukemia was hardly considered, although the blood picture could not be satisfactorily explained on the basis of a simple leukocytosis.

A study of the glandular system showed only a slight enlargement of the inguinal glands; the spleen was now easily palpable, two fingers' breadth below the rib margin, and felt soft. There was also a slight enlargement of the liver.

A study of numerous blood smears was now made until there was no doubt that there was present, in addition to the original myelitis, an acute leukemic process, either as an accidental coincident or as a direct consequence of the infection which was at the basis of the myelitis, or as a direct consequence of the myelitic process itself. These seemed to be the only three possibilities. The clinical picture now assumed that of a typical, rapidly progressive fatal leukemia. The myelitic symptoms themselves became of secondary importance, the temperature continued high, there was an increasing facial pallor of a lemon tint, and on July 30 numerous hemorrhages into the skin and mucous membranes were seen. Leukocytosis continued to increase—82,100 on July 29 and over 130,000 on the day of his death. The systolic blood pressure slowly dropped, and patient was evidently entering on the terminal stages of his disease, and gradually passed into a coma and died at 1:55 p. m. July 31. In spite of every effort, no postmortem could be obtained.

A STUDY OF THE BLOOD.

This was undertaken by one of us, to whom the preparations that had been made during the patient's hospital stay were submitted after his death. On the day of the patient's admission to the hospital the routine blood count was done. There were 11,500 leukocytes to the c.mm., and of these 73 percent were neutrophiles, 4.8 percent were myelocytes, and 6.3 percent were unclassified. It is probable that these cells, which the house officer was unable to classify, belonged to the type that predominated later.

Between June 27 and July 24 eight leukocyte counts were made, and the number of cells ranged between 11,000 and 38,000. On July 27 the leukocyte count was 62,100, and on this day spreads were again stained and studied. These presented a most unusual picture. The red cells were quite normal in staining reaction, size, and outline. The leukocytes were made up almost entirely of one type of cell, which at first blush impressed one as the usual lymphocyte. Spreads were not studied daily until the patient died. The absolute number of cells increased by slow gradations from 62,100 on July 27 to 137,200 on July 31, but the leukocytic picture remained monotonously the same. Now and then one came on a polymorpho-

nuclear neutrophile, but the vast majority of cells were nongranular monocytes. These constituted on none of the last six days less than 96 percent of the whole number of leukocytes.

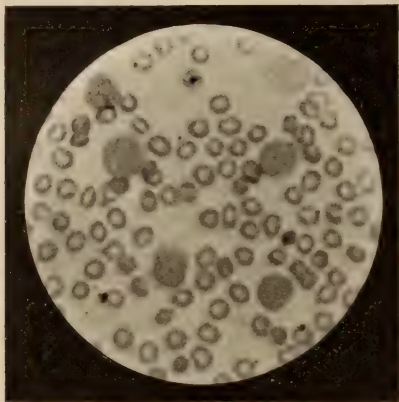


Fig. 6.—Microphotograph of blood specimen.

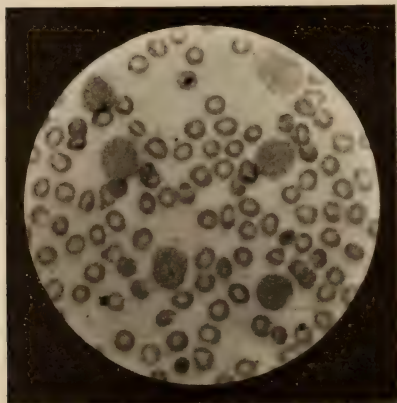


Fig. 7.—Microphotograph of blood specimen.

These cells were considerably larger than the red cells (approximately 12 to 15 microns) and had a basophilic protoplasm.

The nucleus was very finely reticulated and granular, and at times contained nucleoli (1 to 3). The nucleus was centrally placed and made up about three-fourths of the cell. Some of the cells showed indentation of the nucleus. None of them contained azure granules, nor was the nucleus as basophilic as that of a lymphocyte. A careful search on the last six days revealed no eosinophiles or mast cells. In the specimen of July 24 a very few cells contained neutrophilic granules. These must be classed as myelocytes or promyelocytes. The mononuclear cells were very fragile. Many of the spreads contained a large number of shapeless masses that were evidently leukocyte wrecks (Schollen of Gumprecht). Of two

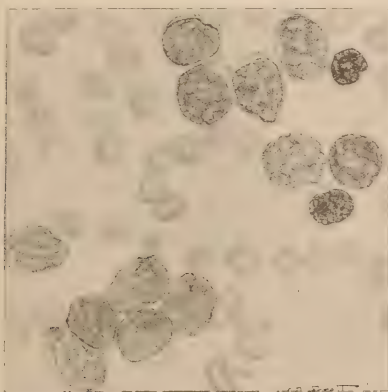


Fig. 8.—Drawing from several blood specimens.

spreads made at the same time, one would contain a large number of these cell wrecks, another only a few.

The red cell count was made only three times during the patient's stay in the hospital. On admission they numbered 4,600,000, and on the day of death, 1,432,000. The hemoglobin was 90 percent on July 27 and 60 percent on August 31. The red cells showed no pronounced changes. Toward the end they were paler, varied slightly in size, but were not deformed or polychromatic. No nucleated reds were found in any of the specimens.

We have here a very unusual response on the part of the blood-forming organs to a stimulus, due probably to a peculiar susceptibility of the hematopoietic system to stimulation, or a peculiarity of the stimulus, or to a combination of the two. The condition cannot be called a leukemia. It ran its course too quickly and did not

present the clinical features of an acute leukemia. From the blood picture alone it could not be called a leukemia, and the histologic evidence that might have justified such a diagnosis is unfortunately lacking.

It is not possible to classify with certainty the cells that dominated the blood picture. The differentiation of lymphocytes and myeloblasts on morphologic grounds alone can often not be made. These cells, however, correspond to the description of the myeloblasts of Naegeli—the lymphoidocyte of Pappenheim. The absence of true myelocytes (except on one occasion) and of intermediate forms may speak against the probability of their being myeloblasts. The absence of azure granules makes one feel that they cannot be lymphocytes. It is regrettable that some of the simpler biologic tests that might have aided in the differentiation were not made. In the absence of these it would seem from a study of the cells that they are probably myeloblasts. The blood picture is then to be considered a leukemoid one, a septic myelocytosis.

Acute lymphemia as a transient phenomenon in an acute infectious process has been reported once at any rate (Kleinberger, München. med. Wchnschr., May, 1914). This report is liable to the criticism that has been made of many cases of acute lymphatic leukemia—namely, that the cells classed as lymphocytes may have been myeloblasts. If our present-day conceptions are correct, we would expect a myelogenic rather than a lymphogenic response to an acute stimulus, the result of a virulent infection. It may not be going too far afield to assume that, if the infection in our case had not been so rapidly fatal, our patient might have developed an acute myeloblastic leukemia.

In reviewing the literature, there was found no mention of any association between myelitis and acute lymphatic leukemia. Rolleston (Lancet, 1914, p. 173) describes a case that simulated caries of the spine, but Bourdet, in going over 121 cases of acute leukemia, found no symptoms similar to caries of the spine. Turk (Wien. kl. Wchnschr., 1903, XVI, p. 866) reported a case that had double vision, ptosis of the right eye, and a distinct weakness of the right lower limb, with no sensory changes. There was also a weakness of external and upward movement of the right eye. Very often there was some association between an infectious process and the acute leukemia.

A brief review of the literature up to 1903 is given in Rosenberger's article in the *American Journal of the Medical Sciences* (p. 583, 128 U. S., 1904), where he prefaces a report of a case by reviewing about 72 cases. In going over the literature since 1903, we have found 100 cases in the literature, but in none of them was myelitis noted.

LOCAL ANALGESIA IN THE CURE OF ABDOMINAL HERNIA.¹

By J. H. JACOBSON, M. D., F. A. C. S., Toledo, Ohio.

Local analgesia is a method which has found a definite field in abdominal surgery. It finds its greatest application in operations for the relief of hernia. Results from the older methods of local analgesia have been so unsatisfactory that for a time they were abandoned, or were used only by a limited number of surgeons who had mastered the details of its technic. It will perhaps take some time to overcome the prejudice which has arisen against local analgesia, but sooner or later the profession must realize that a perfected method has been brought into use.

There can be no question regarding the efficacy of modern local analgesia methods; they have come to stay, and every surgeon must become familiar with the technic of their application. Some confusion still exists in the minds of many physicians regarding the form of local analgesia used in the modern technic of herniotomy. There are two methods in use—first, the older method of Schleich, and, second, the newer technic known as the “Braun” method.

In the Schleich technic ordinary hypodermic syringes are used, and each layer of tissue is infiltrated (if possible, under tension) before it is incised. Very small quantities of the anesthetic solution are used, and the injections continue throughout the entire operation. In the Braun method a larger quantity of solution is used with large syringes and needles, the entire operation being surrounded by a wall or barrier of the solution. The operation takes place within the area surrounded by the solution, and is painless throughout. This method has sometimes been called the “conduction” method of anesthesia, or “Leitungs Anesthesia” of the Germans.

The drug which has become standard for local analgesia is novocain. It is used in solutions of $\frac{1}{2}$, 1, and 2 percent, and should always, without exception, be used in combination with adrenalin chlorid, about 3 drops of the standard 1-1,000 solution to each ounce of the anesthetic solution used. Up to the present writing there have been no reported cases of poisoning or deaths from the use of novocain, even in large quantities. I have used as much as 12 ounces of $\frac{1}{2}$ -percent solution of novocain and adrenalin when operating cases of bilateral inguinal hernia. The novocain solu-

¹Read at the meeting of the Twelfth District Medical Society, November 15, 1916, Fort Wayne, Ind.

tions are easily prepared, and are sterilized by boiling for three minutes. They should always be used fresh.

In our earlier work we routinely employed a preliminary hypodermic of morphin and atropin, or morphin and scopolamin, or pantopon and scopolamin. This preliminary medication we have practically abandoned, using it now only for very nervous patients. The local analgesia alone is, as a rule, sufficient. We have found that the more intelligent the patient the more successful will the local and analgesia operations be. In the beginning of our work the criticism was often made that this method of operation could be used only on the ignorant foreign population—that on intelligent Americans it would be impossible. We have found the opposite to be true. With no other method can absolute safety be promised to a patient who is about to undergo an operation for hernia. When this is properly explained before hand, we encounter no psychic trouble whatsoever.

Regarding pain during the operation, with the exception of a little which the patient experiences when the hernial sac is ligated, there is no pain. Of late we have been able to overcome the pain from sac ligation by supplementary injections in the preperitoneal spaces during the operation. This is done after the external oblique fascia is incised and before dissection of the sac is undertaken. As a rule, throughout the operation the patient complains only of a dragging sensation and the feeling that there is something being done. The best evidence that this method of operation is painless is the frequency with which one patient recommends it to another.

The criticism has also been made that as complete work cannot be done under local analgesia as under a general anesthetic. This we have found not to be the case. Complete and thorough work depends entirely on the experience of the surgeon with the method and on his accurate anatomical knowledge. In fact, one of the greatest advantages which we have found has been the ability to do complete work; we have found that the relaxation of the muscles and fascia is much greater with local than under general anesthesia. This relaxation allows more thorough dissection of the sac and the widest possible overlapping of the fascia for suture. It is for this reason that we have gained the impression that recurrences after such operations are less frequent than after operations under general narcosis. I have seen but two relapses in hernia work of this kind. Many of the cases have not gone the two- or three-year limit, and ultimate judgment on this point cannot be given at this time.

The operations are performed just as thoroughly as under any other form of anesthesia, and, on account of the extensive overlapping of the fascia, together with the absence of vomiting after the patient is placed in bed, there can be no reason to believe that

recurrence will not be less frequent than under general anesthesia. We have not found the danger of infection any greater than under general anesthesia, nor have we found that there is a prolongation of the operation.

One of the most important rules in the technic of local anesthesia is the observance of at least a fifteen-minute wait after the injection has been made. No operation should be commenced before the fifteen minutes have elapsed between the time of injection and the beginning of the incision. Failure to observe this rule will cause the patient pain. As it takes about fifteen minutes to put a patient to sleep with ether, the time of anesthesia or analgesia is the same with either method. We have been able to lessen the period of waiting by some minutes by cutting down to the deep fascia and making a very careful ligation of all the superficial blood vessels. This is a very important step in the operation, for it not only allows more time for the solution to act upon the deeper structures, but it also avoids the danger of postoperative hematoma. The constricting action of the adrenalin upon the blood vessels causes less hemorrhage during the operation, but after the operation is completed, when the effects of the adrenalin have worn off, there is greater danger of secondary hemorrhage, and therefore the superficial blood vessels must be accurately ligated.

In reviewing the advantages of local anesthesia for herniotomy, it can be said that there is, first, the absolute safety to the patient; second, that there is greater relaxation of the tissues, making the cure more certain; third, that it compels the operator to handle the tissues delicately and to make accurate anatomical dissections; and fourth, that in actual practice the method is an inducement to patients to have hernia operations performed. When these facts are more generally known by the laity and medical profession, operations for hernia will be much more frequent. Only a very small proportion of all hernias are operated. There are hundreds of otherwise healthy individuals walking the streets with hernia who will not submit to operation on account of the fear of general anesthesia, or on account of the danger which they have learned attended such operations in the past.

Local analgesia should be employed, without exception, in all hernia operations in the aged, especially in the strangulated forms. This admits of no argument, and should always be the method of choice. The disadvantages of local anesthesia which we have encountered are, first, that the method is not applicable in children; second, in extremely nervous patients it is not advisable; third, it is unsatisfactory in a few very large incarcerated forms of hernia, where intestinal adhesions are very great and where an enormous mass of intestinal coils are found in the hernial sac—in other words, in the old, neglected hernias. In such cases it is often necessary

to supplement the local by general anesthesia. We have also encountered some difficulty with the method in cases of incisional hernia where intestinal adhesions are great, and where complete anesthetization in the peritoneum is not possible. The only disadvantage of any consequence, and this is not a serious one, is the inability to always perform a routine appendectomy in right-sided herniotomies. I have removed the appendix during the hernial operation a number of times. When the appendix is badly adherent, dragging upon the cecum causes the patient so much discomfort that we have now abandoned the attempt to remove it as a routine procedure. If we can induce a larger number of such patients to have their hernias operated under local analgesia, thereby reducing the general mortality from hernias (to say nothing of the added comfort which these patients would get from such operations), we have more than overbalanced the single disadvantage of not always being able to remove the appendix.

Thus far I have performed operations for hernia under local analgesia as follows:

171 operations for radical cure of inguinal hernia.

8 operations for radical cure of strangulated inguinal hernia.

12 operations for radical cure of femoral hernia.

8 operations for radical cure of strangulated femoral hernia.

4 operations for radical cure of incarcerated femoral hernia.

2 operations for radical cure of umbilical hernia.

4 operations for radical cure of strangulated umbilical hernia.

6 operations for radical cure of incisional hernia.

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As twenty-eight of these operations were bilateral, the total number of patients were 187. There have been no deaths. In this series the appendix has been removed five times; resection of the bowel in two cases; practically all forms of hernia have been operated upon. Other operations—such as hydrocele, varicocele, circumcisions—have always been done when needed.

CONCLUSIONS.

1. All forms of hernia can be safely and painlessly operated under local analgesia.

2. The method should become the procedure of choice for such operations.

3. The general mortality from hernia in the United States is as great as from any one of our infectious diseases. It can be lessened only by more frequent radical operations. Local analgesia seems to be at present our best means of lowering that mortality.

CONDITIONS THAT MIGHT HAVE BEEN OTHERWISE DIAGNOSED, WHICH WERE SYPHILITIC.¹

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Authorities tell us that it is not usually until the third or fourth week of the primary stage of syphilis that the blood Wassermann is positive, but at this time the nervous system may already be involved. Ravaut has reported a lymphocytosis in the cerebrospinal fluid as early as two months after the infection. It appears that the nervous system is more liable to be attacked in the cases showing the mildest symptoms in the early stage.

As syphilis gives rise to diffuse and multiple lesions of the nervous system, it is not surprising that many varied clinical pictures present themselves. Numerous writers have at various times attempted to set up clinical types of brain or spinal syphilis, but each of these types or symptom groups has been found, by increasing experience, to be inconstant and variable, for many forms of chronic diseases due to syphilis are not manifested in the usual way. Syphilis of the cerebrospinal system does not have a recognized course and a definite symptomatology. Classical pictures of a disease are largely literary efforts (Jelliffe). Frequently one stage of syphilis overlaps the next and may confuse the diagnosis. Even if a positive Wassermann reaction is obtained in a certain disease, one must not be carried away by such a report, for syphilis may exist with other diseases, just as we find combined psychoses in psychiatry.

The lesions of syphilis are peculiar. Thus, a specific inflammation may be so slightly formative as almost to resemble a simple inflammation, or may be attended by so large a plastic exudation as to lead to extensive new formations. The morbid condition may be found anywhere in the central nervous system.

We are aware that it is not unusual for the pains of locomotor ataxia to be treated for rheumatism, sciatica, gastritis, and the like; and I thought it would be interesting to cite a number of cases which were provisionally diagnosed as other diseases and finally found to be due to the toxins of the spirocheta pallida. A negative Wassermann means very little in the presence of a clear clinical picture, and the disease should be treated as syphilitic. Nonne has said: "The Wassermann reaction is only a symptom." "Latent

¹Read at the fifth annual meeting of Alienists and Neurologists of the United States, Chicago, Ill., June 19-23, 1916.

syphilis with a negative Wassermann occur in about 35 percent of cases, with no active signs of the disease, but with a clear history of infection" (Jelliffe).

1. *Epilepsy and Goitre*.—Boy, aged 9, came to the dispensary with history of epilepsy. Examination revealed an enlarged thyroid; the tonsils also were enlarged. This case appeared to be an epileptic state due to some form of toxemia, possibly thyroid. Later the blood showed a positive Wassermann reaction. Antisymphilitic treatment was instituted. In about six weeks the thyroid gland became normal and the convulsions ceased.

2. *Meningoencephalitis of Traumatic Origin*.—Boy, aged 15, three years previously was struck on the head with a wagon-shaft. Since then he tired out easily, had headache, vertigo, loss of appetite, was irritable at times, and had to give up work on account of making mistakes in collecting. He came to the clinic suffering with intense headache, slightly delirious, skin hyperesthetic, temperature 103° F., and some retinitis. At times he talked incoherently, and had periods of violence alternating with stupor; bowels constipated. This case was provisionally diagnosed as a meningoencephalitis of traumatic origin. The x-ray examination showed nothing abnormal. The blood gave a positive Wassermann reaction; the blood of the father and mother gave positive Wassermann. Case finally diagnosed as juvenile paresis, and the patient was committed to a state hospital. The sister of the patient has an exophthalmic goiter, and blood also gave a positive Wassermann reaction. Camp says: "There are many cases of meningoencephalitis and meningomyelitis occurring in children that are due to inherited syphilis, but which are often mistaken for tuberculous meningitis or poliomyelitis."

3. *Amyotrophic Lateral Sclerosis*.—Male, aged 32, came to clinic complaining of weakness in left arm. History elicited that, while working as a tailor, he noticed his left arm becoming weaker and smaller. This condition gradually progressed for two years. He had been out West for six months for bronchial trouble. Examination showed a deformity of left hand (claw hand, with marked atrophy of upper and lower arm). Patient stated that weakness started in fingers. Fibrillary tremors were noticed in upper arm. No sensory changes, except slight aching in shoulders. The scapula on left side was prominent, and there was atrophy of the infra- and supra-spinous muscles. He complained of excessive sweating of arm and shoulder. Supinator longus and triceps reflexes were increased. The patient walked slowly and with stiffness of left leg, and the knee jerks were increased. The provisional diagnosis was amyotrophic lateral sclerosis of unknown origin. The blood was examined for Wassermann and gave negative reaction. Patient, on account of weakness, was placed in a hospital, and spinal fluid gave positive Wassermann. Under antisymphilitic treatment he is gaining in weight, and says he feels stronger.

4. *Flat Foot*.—Male, aged 39, history of gonorrhea about 15 years previous. Two years ago, while on a vacation, noticed pains in feet, and was provisionally diagnosed as "flat foot." Further examination showed slight Rombergism, pain on deep pressure of nerves of lower extremity, some delay in urination. Finger-finger and finger-nose test defective, slight defect in articulation, slight subjective girdle sensation. Knee-jerks slightly decreased. Patient was irritable and presented many neurasthenic symptoms. Wassermann on blood was negative, but spinal fluid gave positive reaction; pupils were normal. Final diagnosis, incipient tabes. Under antisyphilitic treatment patient is improving.

5. *Malaria*.—Male, aged 45, complained of pains in legs. As he had previously lived in one of the southern states and had malaria, he came to clinic to be treated for that. Examination showed both knee-jerks increased, but unequal, tenderness of nerves of lower extremity on deep pressure, paralysis of sixth cranial nerve on right side. Slight headache, disinclination for work, and slight memory defect. He also presented many neurasthenic symptoms. Wassermann on blood positive. Provisional diagnosis, cerebrospinal syphilis. Under treatment, apparently recovered. The blood of 50 patients in which malarial parasites were present was tested by Sutherland and Mitra for a Wassermann reaction. Nine cases were positive.

6. *Arteriosclerosis and Kidney Disease*.—Male, aged 50, came to clinic complaining of slight headache, some insomnia, a general feeling of malaise, attacks of giddiness, was irritable, and showed lack of control over emotions; also complained of temporary sensations of numbness and weakness in left leg, irregular darting pains in head, and uncertainty of vision. He was slightly forgetful and made mistakes in his ordinary work. Arteries were sclerotic and urine showed albumin and casts. Further examination showed Argyll-Robertson pupils, more so in right eye, and some optic neuritis of both eye grounds. There was a tremor of eyelids, lips, tongue, and fingers. Coordination defective, as shown by finger-finger and finger-nose test, also by gait and slight Rombergism. Knee-jerks were exaggerated. There was a tenderness on pressure of deep nerves of lower extremities. He complained of gastric pains. His wife said he was forgetful and very irritable. He denied gonorrhea or syphilis. Wassermann on blood strongly positive. Under antisyphilitic treatment for four months, pains disappeared and patient is gaining in weight. The left pupil now reacts readily to light, but right only partially recovered. Final diagnosis, paresis.

7. *Tumor of the Uterus*.—Female, aged 29, history of one miscarriage, twice married. Complained of uterine trouble, with pains in legs. Had been advised that she had tumor of the uterus, and

examination elicited a mass within the pelvis. Patient said the pains in legs and plantar surface of the feet were sharp at times. There was tenderness of deep nerves of lower extremity. Pupils large, no Argyll-Robertson, but hippus (fatigability of light reflex). Both knee-jerks decreased. Some delay in emptying the bladder, pains in stomach at times, previously suffered with headaches, Rombergism slight. A Wassermann of blood was taken on husband and wife. Husband showed a negative reaction and the wife strongly positive. Under antisyphilitic treatment, pains have disappeared, patient is gaining in weight and feels better. Am advised that tumor is disappearing. Final diagnosis, incipient tabes. Kaarsberg found a positive Wassermann in many patients with uterine cancer, and declares that uterine cancer should be included with parasyphilitic affections. Whitehouse and McLroy found a positive Wassermann in many cases of metritis, while Pacola and Cioja are said to have found circumscribed and diffuse infiltration and connective tissue changes in the uterine cervix in certain cases which proved to be of a syphilitic nature. Hoffmann has published a case of gummatous endometritis.

8. *Sciatica*.—Male, aged 36; came to clinic complaining of pain in hip. Gonorrhea five years previous, history of syphilis fifteen years previous. Examination showed sciatic nerve involved on left side. Pupils normal. Wassermann positive.

9. *Goiter*.—Female, married, three miscarriages—one still-born, one child died at 15 months of measles. Patient complained of headache and nervousness; also had goiter, rapid pulse, trachycardia, tremors, etc. Wassermann on blood, positive. Is improving under antisyphilitic treatment. Dr. J. J. Moore tells me that of 50 cases of simple goiter, 30 percent gave positive Wassermann. Of 10 cases of exophthalmic goiter, 3 were positive.

10. *Menière's Syndrome*.—Female, aged 50, widow. Came to clinic complaining of dizziness and difficulty in walking. History elicited that about six months previous, while in a moving picture show, there was a sudden noise (ringing) in the right ear, then dizziness, followed by vomiting. Since then the patient has been somewhat deaf. Patient said that about six years previous she could not raise right eyelid, and after taking "drop" medicine for months she recovered. Formerly used alcohol freely. Wassermann positive. Neurological examination showed Argyll-Robertson pupils, lost knee-jerks, marked Rombergism, and a tendency to fall toward the right when walking. Finally diagnosed as tabes dorsalis. Jelliffe and White in *Diseases of the Nervous System*: "In tabes the acoustic is occasionally involved, producing deafness, nystagmus, Menière-like crises, etc.

11. *Gastralgia—Epileptic Equivalent*.—Male, aged 38, married. No history of luetic infection. For the last three and a half years

had attacks of pain in the upper abdominal region every night between 12 and 2 o'clock. The pains were spasmodic and griping in character, and were relieved only by opiates. No soreness or tenderness afterward. Neurological examination, negative. Patient was inclined to be quarrelsome. As the pains came on periodically with change in the emotional field, the case was first diagnosed as an epileptic equivalent. Blood on examination was positive. Patient was placed under antisyphilitic treatment and improved slightly.

12. *Epilepsy, Hemiplegia and Raynaud's Syndrome*.—Male, aged 28, single; used alcohol and tobacco moderately. As a child he suffered with chilblains on toes and fingers. When 20 years old the fingers and toes would get cold and blue, then improve. Later gangrene set in, and two fingers were amputated, also middle toe of left foot. When 25 years old had a "fainting spell" while on the street, and since then the left arm and leg of right side were weak; speech at times was affected. Since then he has had one or more convulsions every week. Wassermann on blood was positive.

13. *Raynaud's Disease*.—Female, aged 51. Had typical symptoms of Raynaud's disease, which had reached the third or gangrenous stage. She also complained of vertigo and slight convulsive attacks. The usual treatment for this condition was instituted, but she derived no benefit. Then thyroid extract was tried for some time, with no relief. Finally she was given a mixed treatment internally and the fingers were dressed with blue ointment. The convulsive attacks and vertigo have disappeared, and the fingers are nearly normal. The blood gave a negative Wassermann. She will not allow a spinal puncture.

14. Frequently, especially in state hospital work, one meets a chronic alcoholic with a history of syphilis. A number of these cases present many symptoms of general paresis, and the diagnosis is finally made by the positive Wassermann, Nonne's test, and cell count of the spinal fluid. Recently such a case appeared at the dispensary. These cases do not seem to run the rapid course of an ordinary case of general paresis.

15. Charcot's joint may at times be confused with a tubercular arthritis. A blood and spinal fluid examination, a tuberculin test, an x-ray, and also a neurological examination should clear the diagnosis.

As syphilis presents so many varied clinical pictures in chronic diseases, I believe a blood and spinal fluid test should be made on every nervous case entering a medical dispensary. Dr. Joseph Collins says: "One should suspect syphilis as the cause of diseases of the nervous system in every instance in which the cause is not obvious."

THE COMPARATIVE RESULTS OF THE EXAMINATION OF FECES PREPARED BY THE METHODS OF CENTRI- FUGATION AND NON-CENTRIFUGATION.¹

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As a necessary routine preliminary to the treatment of all cases in the tropics, especially in the laboring class, who are constantly exposed to all manner of infections, the feces should not be overlooked, for the larger percentage of the population will be found to harbor intestinal parasites from one to five in number and even more. Usually the workers in this field are without means to employ the finer technics in the diagnosis of these conditions, and are forced to make a diagnosis from symptoms, later proving its correctness by following the administration of vermifuges and finding the expelled adults in the stools.

Others more fortunate, and possibly more progressive, employ the microscope, thus readily clinching the diagnosis. The method followed is to mix a portion of the stool, usually from 1 to 2 grains, with a drop or two of water on a slide, spreading it out as a thin smear, some using a cover-glass to insure a microscopically transparent field, and then to search for ova. As a rule, there is little trouble and the search is soon rewarded by the discovery of one or more, for the infections are mostly heavy. When negative results are obtained, a diligent worker repeats the smears until from three to ten are examined, taking specimens from different parts of the stool. At times one will be rewarded by finding one or more ova when the second or third slide is reached. This method, though fairly efficient, is not without its faults, for, even in localities where heavy infections are met with, the element of error will range from 10 to 15 percent. In other localities where the frequency of infection is less the error would obviously be increased; the less the number of ova per given specimen, the less likely they are to be found.

Modern times have brought to us the centrifuge, a most useful part of our laboratory equipment, which will give the best and most accurate results when handled intelligently. The elimination of error is readily seen when a comparison of the results of both methods is made. The percentage of negative converted into posi-

¹Published with the permission of the general medical superintendent of the United Fruit Company.

²Absent on leave 1917-1918.

tive findings for single infections, also from single to double and even triple, and so on, give one a different idea of the value of results reported on the examination of simple smears. The accompanying tables demonstrate the efficiency of the centrifuge. The method employed is to take about 10 grams of feces, thoroughly mix with water about three times the amount of the specimen, strain through two layers of gauze, and proceed with the washing as suggested by Bass.³ The sediment is drawn off with a pipette and placed on a slide, using a cover-glass if necessary. The specimen is examined by moving the slide from right to left, then returning to the right, moving it forward each time; this is, of course, facilitated by a mechanical stage.

One hundred and seventeen specimens were examined, all unselected, and the results are given below:

	Non-centrifuged.		Centrifuged.		
	Number.	Percent- age of total.	Number.	Per- cent- age of total.	Per- cent- age of error.
Single infections.					
Ascaris.	3	2.5	3	2.5	0
Strongyloides.	2	1.7	2	1.7	0
Tenia solium	0	0	1	0.8	100
Trichocephalus dispar	18	15.0	20	17.5	11
Uncinaria.	16	14.0	11	9.5	68
Double infections.					
Ascaris and strongyloides.	1	.8	0	0	100
Ascaris and trichocephalus.	2	1.7	0	0	100
Ascaris and uncinaria.	2	1.7	1	.8	50
Strongyloides and trichocephalus.	1	.8	1	.8	0
Strongyloides and uncinaria.	0	0	5	4.0	100
Trichocephalus and uncinaria.	10	8.0	22	18.5	130
Triple infections.					
Ascaris, strongyloides, and uncinaria.	0	0	1	.8	100
Ascaris, trichocephalus, and uncinaria.	8	7.0	10	8.5	20
Strongyloides, trichocephalus, and uncinaria.	0	0	1	.8	100
Quadruple infections.					
Ascaris, trichocephalus, uncinaria, and oxyuris	0	0	1	.8	100
Positive.	63	54.0	79	67.5	
Negative.	54	46.0	38	32.5	
Total.	117	100.0	117	100.0	

ANALYSIS OF RESULTS.

Taking the difference in findings as a whole, the error amounts to 14 percent, or the percentage of increase in the number of positive specimens. Taking the difference in individual infections, the percentage naturally shows a wider variation and the element of error obviously more marked. Citing ascaris lumbricoides infections first, the number remains as 3 or 2½ per cent.; but of the original number, 1 was proved to be a double infection and an

³C. C. Bass: Mild Uncinaria Infections, Arch. Int. Med., June, 1909.

extra one was added from a previously negative specimen by centrifugation. Coming to trichocephalus, we see that the original number was 18, and on centrifugation four were shown to be double infections, while 6 were added from those previously negative. Uncinaria gained 2, but lost 7.

Double infections are best represented by our most common combination of trichocephalus and uncinaria, which were increased from 10 to 22, or an error of 130, demonstrating a gain of 10 from single infections and 2 from non-centrifuged negative. Of the triple infections, only three combinations are found, but which show a marked difference resulting from the two methods especially ascariis, trichocephalus, and uncinaria, which were increased from 8 to 10 in number at the sacrifice of double infections. Of the quadruple combination, only 1 was encountered, simple smear examination having shown only 1 double infection.

The following table gives us a better idea of the gain and loss of the individual specimens that were affected:

	Number.	Loss.	Gain.	Total.
Single infections.				
Ascaris.	3	1	1	3
Strongyloides.	2	2	2	2
Tenia solium	0	0	1	1
Trichocephalus dispar	18	4	6	20
Uncinaria.	16	7	2	11
Double infections.				
Ascaris and strongyloides.	1	1	0	0
Ascaris and trichocephalus.	2	2	0	0
Ascaris and uncinaria.	2	1	0	1
Strongyloides and trichocephalus.	1	0	0	1
Strongyloides and uncinaria.	0	0	5	5
Trichocephalus and uncinaria.	10	0	12	22
Triple infections.				
Ascaris, strongyloides, and uncinaria.	0	0	1	1
Ascaris, trichocephalus, and uncinaria.	8	0	2	10
Strongyloides, trichocephalus, and uncinaria	0	0	1	1
Quadruple infections.				
Ascaris, trichocephalus, uncinaria, and oxyuris	0	0	1	1
Total	63	18	34	79
Converted into positive.	16	..	..	..
Specimens affected by centrifugation.	34	..	..	..

CONCLUSIONS.

1. Centrifugation is the most reliable method to follow in the analysis of feces if accurate results are to be expected.

2. For practical purposes, the ordinary smear method would be applicable in heavily infested localities, provided that at least five slides are examined before a diagnosis can be made or a negative opinion pronounced.

3. In localities where the frequency of infection is limited, centrifugation should always be used.

THE RESPONSIBILITY OF THE PUBLIC IN SOLVING THE PROBLEM OF THE CARE OF THE CRIPPLED.¹

By CHARLES F. PAINTER, A. B., M. D., F. A. C. S.; Boston.

I desire to approach this subject from the socialistic rather than the individualistic standpoint for the reason that the problem of the care of the cripple is one that particularly lays claim on society.

Whatever may be said in criticism of certain phases of social service, and that there is much to be said on that score I am convinced, there is no question that, so far as the education and training of cripples is concerned, this problem could not have been put on a satisfactory basis if left to individual initiative and effort. The cripple whose incapacity has been inherited, or acquired early in life, more commonly belongs to a social order on whom the burden of support and education bears most heavily. Where all the efforts of the wage-earners of a family are required to gain the mere sustenance of the family, the presence of a cripple among them does not make the appeal that it would if there were surplus funds, however small, out of which he could be especially cared. The inevitable neglect of the unfortunate in these surroundings reacts badly on him, and he expects nothing from those to whom he, naturally, might look for help, and must indeed be an exceptionally strong character if he does not become an ambitionless misanthrope. The person who has become crippled through accident or disease in adolescent or adult life has a better chance than the class of cripples just mentioned, for, if one of these has been a wage-earner and through accidental happenings has been unfortunate enough to lose the use of arms or legs, and therefore becomes a tax on his family, he receives more consideration, because he has "done his bit" and it not made to feel that he is of no account. There may be some return from the individual or individuals responsible for the accident, and this is a balm that, in a measure, justifies the existence of the cripple.

The collective application of the measures which are most helpful in restoring function to those incapacitated by disease, heredity, or accident does away at once with the unconscious opprobrium which is apt to prevail in homes of the above-mentioned class by compelling association of cripples with cripples, and self-respect and ambition is encouraged, not stifled. There are many instances in history where those of high mental and artistic abilities have attained distinction in spite of their handicaps, and yet, because of

¹Read before the Evans Memorial, Boston, Mass., January 9, 1916.

their misfortunes, have suffered severely in their sensitive natures on account of real or fancied affronts whereby their whole life has been embittered.

The problem of caring for cripples resolves itself into a question of first establishing a morale which is concerned with abolishing the feeling of isolation on the part of the cripple himself by making him forgetful of his handicap; second, of providing educational opportunities equal in their advantages to those provided for the physically normal; third, of affording the means for technical training adapted to the needs of the individual which shall enable him to make the best use of his natural talents in a way conducive to self-respect and, in as large a measure as possible, self-support; fourth, to secure a market for the disposal of the product of the activities of crippled workers; and fifth, to secure for them, so long as they need it, the best medical and surgical care that the exigencies of the case demand.

Society as at present constituted owes such provision to itself, and should endeavor to develop in itself that same humanitarian impulse which prompts the individual, where the means are forthcoming, to furnish for his crippled dependents a comfortable environment in which to carry on such activities as they are capable of undertaking.

If this is not done, there is bound to be a greater amount of mental suffering than there is any justification for, and economically, there must be a greater number of individuals for whose support the state must needs be responsible. Funds which might be free for other purposes will have to be diverted in order to provide for these unfortunates at the public expense. Statistics compiled by the Sage Foundation show that an investment of from \$200 to \$400 or more per year per caput during the period of school age at an asylum home will suffice to educate a crippled child and fit him to become self-supporting. In the convalescent homes the expense is about \$100 more per caput on the average, whereas in the hospitals the expense runs into much larger figures. In the same way the per caput cost of the plant in each case is greatest in the hospital, next in the convalescent home, and least in the asylum home school, ranging from an average of about \$1,100 at the lowest cost to \$2,500 at the highest. It is probable that the chief reason for this difference lies in the fact that the hospital must be an urban institution, and the cost of land and the expense of buildings and upkeep is necessarily greater in the city than in the country.

At the Canton School here in Massachusetts, an institution which ranks among the best, along with the Widener Home in Philadelphia, the per caput cost of the plant is \$1,105, which includes the value of the farm, live stock, and equipment. The Widener Home

per caput cost is about \$11,000, which does not include the cost of gardeners' cottages and stables. These few figures show the basis on which this work may be done in the three types of institution to be presently described, and the conclusion which I shall draw is based on these data to a considerable extent.

Modern civilization is taking to itself the responsibility for the care and education of the cripples in its midst. From being objects of ridicule—the butt of the thoughtless joke—and a burden borne with varying degrees of equanimity by the individual members of a family, where the responsibility can be met at home—to the exercise of absolute indifference to what they did or what became of them when consigned to the almshouse—the cripple who is needy today has the prospect of receiving every sort of consideration. A number of factors have brought this about.

In spite of all the fault we may find with certain tendencies of this age and generation, it is probable that the primary reason for our present-day progress in the handling of this problem is the very spirit of mercenary industrialism by which we, as a nation, are being actuated in so many ways. We may not lay claim to any more human sympathy than our ancestors, for we will do less to merit the reputation of being kindly neighbors than they did. Our philanthropy is based to a large extent on self-interest. We desire to lessen our own personal responsibility and distribute it among the many with such checks as we may easily impose.

The present war has already emphasized the importance of movements for the care of the crippled, no matter what the cause for crippling may have been. The progress of industrial accident legislation is making evident the importance of establishing centers for the prevention of that sort of crippling which grows out of injuries, received in the course of the day's work, by those who receive a day's pay. We, in this country, have been very slow to see the necessity of making some provision, not only for our individual cripples, but for those, as well, who have suffered disabling injuries the recovery from which is slow and the impairment in function from which may be little or much according to the ability of the patient to carry out proper treatment for a sufficiently long time. The financial position of the patient may be such that a reasonable lay-off from his occupation might be borne without serious handicap, but not such a lay-off as is oftentimes essential in order to secure the best results from a treatment capable of restoring function if kept up long enough. The bulk of our industrial accidents looms very large, and the economic value of a few days or weeks of productive labor saved here and there would make a good showing on a balance sheet covering the record of losses in wages and expenditures for medical and surgical attendance, leaving

out of consideration the loss in the productive capacity of the industries thus robbed of their workers.

As might be expected, the country that has raised its industrial efficiency to the highest level has considered all these questions, and has provided throughout the length and breadth of Prussia for the care of those who have been more or less crippled through industrial accidents, as well as because of handicaps to functional activity from other causes. At these institutes may be obtained the various sorts of physical therapy appropriate for the many disabilities arising in the course of industrial life and rendering the worker inefficient. That these institutes have played an important part in keeping the German arms in the field to the present time needs but little argument. Injuries to joints and the structures in the immediate neighborhood of joints have been common in the war. These institutes have been equipped to restore function to disabled joints in the shortest possible time, and through their aid soldiers have been enabled to be returned to the firing line at a rate which has been one of the surprises of this conflict.

We will first consider what is being done for the crippled child, and this will come home to us the more strongly in view of the recent prevalence of that most crippling disease among children—viz., infantile paralysis. It is estimated that there are from 150,000 to 250,000 cripples in this country. We have as yet had no census of them as they have in England and in Germany, but in a population of 100,000 there will be about 3,500. The English census revealed 400,000, and Professor Lange, of Munich, has stated that there are 98,000 in Germany.

We are quite as badly prepared to deal helpfully with these unfortunates, as has been the case with tuberculosis in our sanatoriums. There are in this country about 40 institutions equipped to give some sort of care to these sufferers. To be exact, this number in 1913 was 37. Germany had about 40 four years ago. The capacity of these institutions is 2,400. New York has about 2,700 cripples of school age, and accommodations for but comparatively few of them in hospitals and for only a very small number in any institutions where educational advantages might be secured. These few figures will serve to show how inadequate are the accommodations for the proper care of crippled children.

The bulk of the children in the crippled classes are from the strata of society worst prepared financially to provide for them and least appreciative of the handicap under which they labor. They are, as a rule, probably less cognizant of the possibilities that care and education offers to these individuals. Parents, regarding these unfortunates as hopelessly beyond the pale of assistance, abandon all hope and neglect many of those things, which, if they would only insist on them, might make the lives of the victims less

hard and bring the sense of reward that accompanies the successful performance of a duty.

Most of the victims of crippling deformities are otherwise sound. Their mentality is good—they possess the instinct for beauty in form, color, and sound, being kept from the enjoyment of such faculties only by diffidence and the sense of aloofness born of sensitiveness. If one cannot or will not mingle with his fellows, he misses much that would be worth more than book learning or vocational training alone, and there is something about the mere knowledge that you are not as others are which, in a sensitive nature, serves to isolate you from your kind, and breeds within you a distrust of your own powers, leading to atrophy and disintegration of those qualities necessary to success. Now and again one rises above this and succeeds in carving a niche for himself in the hall of fame, but for the majority the handicap is too great.

From the very beginning for those whose physical defect is congenital, the environment of home is oftentimes not sympathetic and helpful in the best sense, though well intentioned. Indeed, it is rare that any chronic disability can secure for itself among those who are bound to the sufferer by ties of blood the moral support and assistance which the condition merits. The occasional examples of self-sacrificing devotion which we all can recall may not be destined to bring out the best in the unfortunate cripple, beautiful as they are to witness.

Where means are not ample to provide educational and other advantages and the unfortunate must be left to secure what he can in whatever way he may, the chances are very large indeed that a failure will be recorded, if the result is measured up with what might have been accomplished.

Present-day provision for those who need public aid has been provided in a three-fold manner—viz., the almshouse, the day school for crippled children only, and the hospital-home-school, the latter a state institution, the two former usually a town or county institution in the case of the almshouse and a private enterprise or a part of the public school system in the case of the day school.

It has been pretty conclusively shown that the crippled child cannot be educated along with the normal child. Marcus, in Posen, Germany, pointed this out some years ago, and it has been the universal experience. Because of his physical handicap, the cripple is more often than the normal child compelled to be absent for a day or so at a time. His low resistance to infections and the readiness with which he becomes fatigued always lay him open to losses of time, and in a school where both the normal and the cripple are being taught these interruptions interfere with the smooth running of the school, and are unfair to the normal children. A further positive advantage of segregation for the crippled children in school

is the fact that crippled children suffer physically from competition with normal children and cannot render the best account of themselves.

The problem of the right handling of the child crippled because of congenital physical defects or disease acquired early in life varies in accordance with the local home and community environment, and for this reason there must be different methods of meeting the problems as they arise. Conditions in the country and in sparsely settled localities, where there are only two or three, or at most a very small number of this class among both the "well-to-do" and the poor, obviously present different problems from those arising in the cities. There must be difficulties not encountered where there are enough of those who cannot afford the special consideration which their condition demands to make it worth while to have a special equipment provided. Those whose parents can afford to take advantage of private instruction will or can secure that which is best, wherever they are. These circumstances alone have resulted in the inauguration of three distinct methods of solving these problems.

The combined method, by which the children are taken from their homes and kept at a school, which is a hospital as well, where they are cared for over a period of years, or until they have become trained to some manual industry by which they may become self-supporting is one type. This is the hospital-school, which comes in all ways but one nearest to a solution of the problem. The most conspicuous institutions of this type in this country are the Minnesota State School, the Massachusetts Hospital School, and the White Plains extension of the New York Hospital and Dispensary. The Widener School in Philadelphia is doing a similar work, but under such luxurious surroundings as to be open, in my opinion, to objection on this score alone; for a child brought up in poverty and squalor to be surrounded through the formative years of his life by conditions which he can never hope even to approximate is certainly not putting a premium on the acquisition of a revenue-producing trade.

Let us now consider the merits of these types of institution. In the first place, let us take the home for incurables idea. This is, in these days, a negation of everything that speaks for progress. It can offer nothing except more perfect shelter, more comfortable surroundings, and better food than many can obtain in their own homes. It is unlikely that it will be able to offer anything in the way of proper orthopedic advantages for the care of the deformities, the dressing of wounds, or any other facilities connected with the management of such cases. The whole spirit of such a place is foreign to up-to-date methods. The name is enough to vitiate any real influence for good that it might otherwise possess. Along with

its failure to provide proper orthopedic treatment for these cases goes a much more serious defect, and that is the taking away of all moral initiative from the crippled child. In such an institution anything that is introduced for the betterment of these children is distinctly of a second-rate quality, whether it be graded school work or industrial training.

Where the hospital side of their care receives the chief emphasis, even though a long stay is permitted, there are no other of the important features in the treatment of the cripple provided. At Berck-sur-Mer there are 1,000 beds, but here, however, the patients are given an opportunity for a long stay in the hospital, nothing being done to help them toward anything more than some physical betterment.

In the second place, let us consider the day school idea. This has certain very definite advantages, chiefly that the child may be in his own home for a part of the day. He is called for and taken to the school at the school's expense, where it is necessary that he must ride, in a carriage or a barge. He is given a good plain dinner at school, and extra lunches in the middle of the morning and afternoon. In the School for Crippled Children in Boston the pupils are taken at six years and carried through the grammar grades, fitted to enter the high school. If they are physically fit to continue in the high schools of the city with normal children, they may do so. A good many do. Others enter the industrial departments of the school and many become sufficiently proficient to earn considerable, a part of which goes to the school to cover the cost of materials and the rest is paid to the pupil. It is not uncommon for pupils in the industrial departments to be earning \$5 or more per week. This is done in the sewing and printing departments chiefly. If these children have surgical dressings to be done, the school nurse attends to them as often as need be at the school. The school physician visits the school at least once a week, and sees any children that are reported for any in disposition; observes whether their apparatus is properly adjusted, and notes the general hygiene, condition of the building, school rooms, etc. If in his opinion there is reason for sending any child back to the hospital clinic from which he came, he is so referred, and the school superintendent sees that he is taken. This rule is scrupulously observed. Once a year the children are thoroughly examined by some of the school's medical committee. An attempt is made to see that all the school's pupils are sent out of the city for a seashore or country vacation for a portion of the summer. Medical gymnastic instruction is given four or five days per week in small groups of two, three, or five. An open-air school room is in operation now for those most needing it.

Vocational instruction is given in cooking, clay modeling, sloyd,

cobbling, printing, cane seating and basket work, sewing and embroidery. At 4 o'clock the children are returned to their homes, at the expense of the school in most cases. Where the parents can afford it, and the child is fit physically to do so, the parents are asked to pay the traveling expense of the child on the street cars, provided they pass near enough to the house to justify that method of transportation. One of the chief objects in furnishing free transportation is to lessen the burden on the child of getting to and from school against his physical handicap, thus using up some of the energy he needs in his school work. If various physiological processes in the young interfere with this capacity for application to their school duties and constitute a reason for not crowding them in school at such times, certainly a deformity which imposes both mental and physical hardship on the child should not be allowed to operate to its detriment any more than possible.

Now we come to a type of institution for the care of cripples which is deserving of our most careful consideration, and that is the resident hospital school. Here the child is placed by the parents for a period of years, during which time its orthopedic condition receives such treatment as it needs. Its apparatus is kept in order. The minimum amount of time is lost on account of repairs to apparatus or other orthopedic attention. Graded school teachers are employed to conduct the instruction, and industrial classes are carried on at the same time. It is possible in such an institution to provide everything that the crippled child needs, except the influence of its own home and parents. It is doubtless true that in many respects the school home is better even than the best of the homes from which these unfortunates are brought, but nevertheless the relationship of parent and child should not be disturbed without very great reason. When there is sufficient reason, there should be frequent enough visits to the home so that a realization of the existing relationship is not allowed to wane. When the child is at last released from the institution, he should be qualified to earn, in large part at least, his or her support.

The fourth method, that of providing vocational training for cripples in separate classes in the public schools where they are graded as normal children are, does not differ much in plan from that of the privately supported nonresidential schools for cripples, but is open to some objections that do not pertain to the latter, chiefly that they are brought more in contact with the normal children who are no respecters of the feelings of the deformed. We should perhaps not blame the children too much for this brutal attitude, for it may be that it is a vestige of our early animal characteristics. In ancient times the indigent cripple was regarded as cursed of God, and they were killed or cast out from human society. At the commencement of the Christian era the feeling

toward them had advanced only so far that they were no longer forcibly cast out, but were simply made the subject of jest and sport, and were court or royal fools, jesters or beggars.

In the light of these facts it would seem it was distinctly the duty of the state to provide accommodations sufficient to take care of the crippled among the poor of the state in such a manner that they might be fitted to contribute as largely as possible to their own support after spending such time as may be necessary to attain sufficient technical skill to enable them to produce something which is salable. It would be a grave mistake to offer those handicapped no adequate common school education, and so the plan has been, in the best of the schools, to carry *all* through the grammar grades, and then, if physically well enough and desirous of doing so, they may either go out to the public high schools or remain in the special school for further training along such technical lines as the pupil may show the best qualification for attempting.

In a recent census of the cripples in New York state it appeared that there were over 100 children of school age in the state of New York placed in almshouses, where there was absolutely no chance for them to receive any education, technical or otherwise. This is, doubtless, true of other states.

In the Home for Incurables here in Dorchester this situation was appreciated, and a graded school teacher was employed to give instruction there at the home, and several children were transported to the St. Botolph Street Day School for Crippled Children when they were fit to be sent.

In England, especially in London, the problem of the crippled child has been handled by the establishment of special schools, graded like the public schools, but for cripples alone and supported from the public treasury, as are the regular public schools. Transportation is furnished these children to and from the school where needed. Throughout England in the year 1911-12 there were 67 schools for the physically defective, with an accommodation for 5,200; 58 of which schools were provided for at the public expense. There are prizes offered in some of the English public schools for the physically defective which take the form of scholarships, and a cripple who shows extraordinary capacity may win one of these scholarships, which enables him to take a course or apprenticeship in some industry.

New York city has made some attempt to solve the problem of the education of the 2,700 cripples of school age among her population by the special public crippled school plan.

In Edinburgh, Scotland, there is a society for the care of cripples that always has somewhere about 700 cripples in its charge. The results of the observations of officers of this society is rather interesting, and roughly conforms, I imagine, to the status of the

cripple elsewhere. They say they may be divided into three classes, according to their ability to earn their livelihood after having been through some properly conducted course in industry. A few will be able to get along and earn their support under ordinary conditions of employment with comparatively little assistance—perhaps none at all. Another class cannot be employed for various reasons and require a great deal of individual assistance, and the third class can only hope to be self-supporting through a philanthropically subsidized shop. Some of the schools, like the Widener in Philadelphia, recognizing this, have provided a home for the graduates of the school, where they may find accommodations at very little, or possibly in some cases at no expense at such times as they may find themselves out of employment. Another important matter in connection with the conduct of these schools and homes and industrial plants for the care of crippled children is the disposition of the outcome of their activities. From the very necessities of the case, a great deal of the productive work they do must be done by themselves at home or at the workshops of the schools where they received their education. They find that all their energy is expended when they have created the thing they are qualified to turn out, and they cannot seek a market for it. It requires an energy and capacity for getting out and about among men which they do not possess in order to market their product. There is not so much sentimental interest on the part of the public to purchase the cripple's output as there would seem to be reason for thinking there would be. Some will patronize because they think it a good and charitable act to do so, feeling all the time that the article purchased is probably not as good as a similar one purchased through the ordinary channels of trade. This feeling ought not to enter for a moment into the reckoning, for under modern methods of technical instruction as carried out in these schools the workers are probably as well taught and the materials used are as good as may be had, and for the work that they attempt there can be no reason why it should not be done as well as anywhere else.

The variety of work that is open to the crippled is necessarily limited, and they are not taught to do things that they are not physically capable of doing. The industries that are taught most extensively are, for boys, basketry, cobbling, printing, typesetting, bookbinding, typewriting, wood carving, bootmaking, tailoring, stenography, mat weaving, lithography, machine embroidery, photography, saddlery, tinsmithing, etc. For girls many of the above-mentioned are suitable, and in addition to these certain work that is peculiarly adapted to girls, such as sewing, embroidery, and other forms of needle work.

The necessity of providing an agency to market the product is, of course, an expense that must be added to the overhead charges

of the crippled workers' shops, but it is not a burden which cannot be borne and still give the individuals a reasonable return for their labor. This, of course, concerns those who are obliged to do their work at home. Those who are able to go to the shops and work are treated as others are, but the plan of making them work in this way along with others is not a practical one for the same reason that their education in schools where there are normal children is not practicable. They fret more or less because of the proximity of those not handicapped, and they are often incapable of the sustained work that is desirable in a shop where the work of one depends on the presence and activity of others. It is therefore to be expected that the remuneration which the average cripple may count on from his work will not be comparable to that which a normal person would earn from producing the same thing, after all legitimate overhead charges are deducted, but still there may be counted on an income which will go a long way to self-support. What is lacking in actual financial return may very well be made up in the moral income, so to speak, which the worker earns making him less of a care because more easy to live with, and because of the gratification which comes with the knowledge that he is useful and not a dead weight on his family.

The organization of shops in which the physically handicapped from crippling accident and disease may work has not been as extensively attempted and worked out in this country as have the shops for the employment of the blind. In this community the shop in South Boston, which is connected with the Perkins' Institute, is conducted at no expense to the institution because of the marketable value of its product.

The printing department of the School for Crippled Children on St. Botolph street in Boston as a department is conducted at a profit. The work is almost wholly done by those who are crippled, and even if the overhead cost of rent, lights, and heat were included, would still show a profit. The workers are paid, and this constitutes a charge against the gross income from the shop.

It seems to me it is only a question of time and careful organization which is necessary to put at least on a part-paying basis the institutional work of the state which is directed to the care of cripples. We need even here in Massachusetts more accommodations of the asylum home type; institutions where the cripple may be placed and cared for at the expense of the state for such period of time as may be necessary to make him largely self-supporting. At the arrival of that time he should be returned to his home, and provision made for him to utilize the skill he has acquired in some productive fashion. It is probable that for some little time supervision may be necessary in many cases to see to it that there is no lapse from ambition due to failure to secure cooperation at home

of the seeming difficulties of securing opportunities for work, or for the marketing of product or the procurement of stock necessary for the prosecution of his trade.

As a prerequisite for this is an accurate census of the cripples in the state and a careful analysis of them on the basis of their social or intellectual status. There is a certain small percentage of mental defectives among these, and for the best results these should be culled out. A knowledge of cooperation in the attempts to be made in the education and training of the cripple should enter heavily into the plans made for the individual cases.

If the public at large realizes the possibilities in this problem and lends its assistance to the efforts of the state in providing the facilities, there can be no question that they will reap the reward in the end, in that the burden of the support of these unfortunates will be lessened in the aggregate and distributed as well. The cost to the state may be reduced through commercialization of the industries carried on by the school and the organization of the machinery for disposing of the product.

Most of what has been said applies to the care of those who are crippled from the inherited and acquired causes for crippling in the young. Much could with equal appropriateness be said concerning the industrial accidents of adult life. Whatever views one may entertain as to how fully the injured person should be compensated by society for accidental injuries acquired during the daily routine of industrial life on the theory that, inasmuch as the work being done is for the benefit of society, the industry which reaps its profit from society should bear the cost of such accidents, the fact remains that much of the time spent in convalescing could oftentimes be shortened, and the disability incident to prolonged disuse and lack of the proper facilities for massage and other types of physical therapy be lessened, if there were in all industrial centers institutes where this sort of treatment might be secured at a cost which would not be prohibitive for those in moderate circumstances, and free to those whose resources were too moderate to permit of their expending anything on such measures.

The medical profession in this country is lacking in knowledge and appreciation of such facilities for treatment, and having had no education along these lines themselves, they are incompetent to do the work, and too frequently neglect to advise it where it would be entirely possible to secure it. I might cite many examples of the way in which those who have been treated in the industrial schools where cripples are cared for have so profited by their training that they have gone out and secured positions sufficiently well remunerative to take care of all their needs. I have in mind particularly a young man, the son of a clergyman in a nearby town, whose salary was small and who lost his life through an accident,

leaving a family without any means of support and children too young to contribute, except for one boy who might have been of some help had he not been stricken just before this accident to his father by infantile paralysis. It was a particularly aggravated form which the paralysis took with him, and his arms and hands were all that were spared. His trunk and legs were pretty severely involved. For four or five years he could only get about with apparatus which was cumbersome and expensive. During this time at the Canton School, where he was sent, he has acquired the ability to take a position as a secretary, and in the meantime under the treatment he has been able to have continuously he has improved to such an extent that he is much less handicapped by apparatus now, a fact which will enable him with more ease to secure a position, for oftentimes mere appearance will militate against one's securing a position which one is otherwise wholly qualified to accept.

I trust I have given a sufficiently comprehensive, though necessarily very sketchy, review of what the problem of caring for the cripples, from whatever cause, is. Its importance is great both to the crippled individual and to society.

It can best be solved by a combination of state institutions of the type of our own in Canton, which will care for the cripples in the rural communities, small towns, and cities where there are not enough to justify the establishment of day schools of the type of the St. Botolph Street School in Boston. The latter type is best adapted for large urban populations, and does not entail the prolonged separation of the crippled child from his home surroundings and ties.

Occasionally, of course, in the city there will be found a cripple who would be better off if so separated from home; it might for a time be even better for the home. There is one error that we must avoid, however, and that is the error of allowing the heart to go out of our feeling toward our fellow-man, be he crippled or indigent or otherwise handicapped, simply because society has so organized as to relieve us of the burden of this responsibility. The accumulation of social service data as a basis for our attempts to alleviate the suffering of our fellow-creatures must not be permitted to warp our personal responsibility. We must still go about doing good and "doing our Father's business" in His way, and not by proxy, or by the easier method of an assured contribution.

NITROUS OXIDE-OXYGEN, THE MOST DANGEROUS ANESTHETIC.

By J. F. BALDWIN, M. D., F. A. C. S., Columbus, Ohio,
Surgeon to Grant Hospital, etc.

Much has been written during the last few years highly laudatory of nitrous oxide-oxygen as the anesthetic of choice in major surgery. Some of the writers have been exceedingly enthusiastic. On the other hand, comparatively little has been written adverse to its use, it being very evident that the profession was willing and anxious to give the new drug a thorough trial before stamping it with disapproval. Unfortunately, however, there has been a lack of frankness on the part of many anesthetists in that they have signally failed to report their fatalities, and have even denied their occurrence. This lack of frankness cannot be regarded otherwise than as demonstrating the absence of true altruistic motives on the part of these anesthetists, many of whom, according to Ochsner, have used the new drug chiefly "for advertising purposes."

In comparing statistics, some of the writers include, under the administration of nitrous oxide-oxygen, lists of administrations of nitrous oxide for the extraction of teeth. Statistics thus obtained are not only unfair, but are entirely misleading, and hence even dishonest. Nitrous oxide-oxygen is not on trial for minor surgery, but as an anesthetic for major surgery, and statistics must, therefore, all be recent and covering its use for this purpose only.

In the *New York Medical Record* of July 29, 1916, I published a contribution on this subject in which I reported fourteen deaths from nitrous oxide-oxygen as having occurred in the experience of Columbus physicians and surgeons. One of these had occurred in a dental chair, and one of the others might be regarded as doubtful, but at least twelve or thirteen of the deaths were clearly the direct result of the administration of nitrous oxide-oxygen.

A writer (Davis) in the December issue of the *INTERSTATE MEDICAL JOURNAL* quotes briefly from this paper, and reports (as though it were typical of all) one of the deaths in which the patient was in bad shape at the time of the operation, and would undoubtedly have died within a short time if no operation had been undertaken. Had the writer been anxious to present the true gist of the paper, he would have quoted some of the other cases, particularly case No. 12, which appears in my paper as follows:

"Mrs. McC., aged 37, had a simple abdominal hysterectomy October 28, 1914. In spite of my own protests and those of her attending physician, she

insisted on taking nitrous oxide-oxygen. Dr. Rice administered the anesthetic, which she took beautifully, but just at the completion of the abdominal work, without the slightest warning, the heart's action suddenly ceased and the patient was dead. The heart was at once massaged through the open abdomen, and all the usual measures for resuscitation instituted, but in vain."

Physicians who are interested in this matter would do well to read my paper in full as it appeared in the journal referred to. In that paper I not only refer to a considerable additional number of deaths outside of Columbus, but also refer to a very large number of deaths which, for reasons best known to those who know of the fatalities, *had never been reported*.

There is evidence of a tendency on the part of the official medical press to suppress criticism of this anesthetic.

If the time ever comes when nitrous oxide-oxygen anesthetists will honestly report their fatalities, when they will eliminate the advertising element, when they will reduce their fancy charges for its administration to the level of the administration of ether, we will at once find that the use of the new anesthetic will be limited to its especial field of usefulness as suggested by Ochsner—namely, to cases of acute pulmonary congestion, and of acute nephritis. To quote from the conclusion of my article: "With these exceptions, which make its field a very limited one, nitrous oxide-oxygen should be looked on as the most dangerous anesthetic that can be used, even in the hands of the most experienced."

I have noted with interest and satisfaction that Bloodgood, in the December issue of *Progressive Medicine* (pages 234-235), announces that at the Johns Hopkins, where nitrous oxide-oxygen was used so enthusiastically a very few years ago, they have within the past eighteen months gradually returned to ether. He particularly condemns the nitrous oxide-oxygen in cases in which the blood pressure is high. In addition to this discontinuance of the nitrous oxide-oxygen in his own clinic, he adds (page 242), "the clinics which first began the routine employment of gas-oxygen anesthesia instead of ether are beginning to swing back to ether."

NIGHT CLINIC ON INDUSTRIAL MEDICINE AND SURGERY AT RUSH MEDICAL COLLEGE.

By HARRY E. MOCK, M. D., Chicago.

Beginning this quarter, Rush Medical College is offering a course on industrial medicine and surgery, which will be held at night in order that employees may take advantage of this clinic.

Several medical schools have offered courses on occupational diseases, industrial hygiene, vocational diseases, or some other branch of industrial medicine, but Rush is the first school to offer a comprehensive course covering all branches of industrial medicine and surgery. It is also unique in holding this clinic at night, which is certainly the logical time, for the clinic is meant primarily for the poor wage-earner or for the employee of the small industry who has a large family dependent upon him and who cannot get proper medical care either at home or at the industry where he is employed.

A course on industrial medicine and surgery, in order to be comprehensive, must teach both the undergraduate and postgraduate students the following branches: occupational diseases—prevention, diagnosis, and treatment; supervision of health of employees, including periodical medical examination of employees, medical examination of applicants for work, prevention of disease among employees, industrial hygiene, and plant sanitation; care of injured employees, which must include emergency surgery, first aid, all medicolegal aspects of the result of injury, and the surgeon's part in accident prevention work; prevention of accidents, including the "safety first" movement, cooperation between the doctor and the safety engineer; socialized medicine, including the treatment of certain diseases, the class of employees who should receive free medical care, the work of the visiting nurses among employees, and the duties of the social worker.

This clinic will devote very little time to actual treatment. Worthy cases requiring treatment will be given first aid at night and further treatment at the night clinic, provided they are able to continue at work; if unable to work, however, they will be referred to the day dispensary.

Cooperation between the night clinic and the employers of the patients seen there will be secured through the services of a social worker, who will visit the working places of these patients and secure such changes in work or such means of prevention as have been developed by each individual case.

In order that the students may see the actual system of industrial

medicine and surgery in practice in industries, visits will be made by each class to a number of the large industries in the city where such systems have been installed.

One function of the department of industrial medicine and surgery is the education of employers in the matter of provisions for safeguarding the health of their employees. To this end we may offer, to some of the smaller concerns of the West Side, to examine applicants; to periodically examine employees; to give emergency treatment in cases of accident and sickness; to advise the firm concerning hygienic and sanitary measures; and in each case where an accident has occurred, to point out, as far as possible, means of preventing a recurrence of that accident.

The employers will be permitted to pay for such service, and in this way help to support the work of this department. Every effort will be made, however, not to infringe on the rights of the private physician.

Patients will come, not only to the night clinic, but to all departments of the dispensary at Rush, who will be found to be physically incapable of continuing in their present occupation. It will be the function of the Department of Industrial Medicine to cooperate with the employers in placing these patients in positions adapted to their physically handicapped condition. This work will be done by the paid social service worker connected with this department.

Frequently such agencies as the United Charities have individuals or families applying to them for aid because of real or feigned inability to work. Such individuals will be referred to the Department of Industrial Medicine and Surgery for examination and recommendation as to the expected duration of such inability, if it be found to exist, and as to the kind of work the patient may do. Here again it will devolve on the social worker to either secure employment for such patients or to cooperate with the United Charities.

One of the most important functions of this clinic will be the study and treatment of occupational diseases, and, through the social worker, securing the cooperation of employers for the prevention of such diseases.

Every employee visiting the night clinic will be given individual attention, and, as a part of the supervision of his health, he will be instructed along all special lines of prevention of disease applicable to his individual disease, as well as along the general line of prevention, such as home hygiene and proper living conditions, his part in industrial hygiene and sanitation, and his duties toward fellow employees in order to prevent disease in the working place.

We believe this course will not only be invaluable to the students at Rush, but will render great social service to our community and, through these students, to all other communities where they locate for the practice of medicine.

ROUTINE MILK PREPARATION FOR THE SICK CHILD.

BY JOHN ALLAN HORNSBY, M. D., Chicago.

The literature is full of the chemistry and physiology of milk, and of the technical preparation and formulation of milk for feeding those who cannot assimilate milk in its normal forms; but very little has been written by those who have had intimately to do with the routine preparation of milk for the sick, and especially its preparation in the homes of the people. Even practitioners are often-times at a loss how to give directions to mothers and nurses for the preparation of milk with the facilities that the average home has available. Hence it might not be unprofitable to discuss the subject briefly from the administrative and mechanical standpoints.

First let us state the problem. Milk as it comes from the cow, and unless it be infected at its very source by tuberculosis or by some pus infection in the udder, and assuming that it is drawn under clean conditions by clean hands from a clean udder and into a clean vessel, does not need treatment of any kind for feeding well people, excepting very young infants who are not yet sufficiently advanced to be able to assimilate all the fat content of the milk. In the latter case sterile water alone for dilution will answer all purposes, excepting that sometimes the "butterfat breeds" give a milk with so large a fat globule that it may be necessary, for very young infants or very young animals, to separate it and use the skimmed milk only.

Whether milk as it comes from the cow actually contains the bacteria that afterward we must deal with, such as the lactic acid bacilli or colon bacilli, is a question which involves scientific discussion and makes no difference for our present purposes; suffice it to say that, immediately after the milk is drawn, attention must be given because of the microorganisms present and that these multiply just in proportion as the milk is properly or improperly handled.

Raw milk has an inherent resistance that, under normal treatment, permits the reproduction of what we might call the physiologic microorganisms—that is, the lactic acid bacteria—and inhibits the growth and reproduction of the pathogenic organisms, such as colon, diphtheria, and whatever organisms give rise to scarlet fever, measles, etc. In almost all milk a certain number of colon bacilli are found almost immediately after it is drawn. In raw milk these organisms do not reproduce to any appreciable ex-

tent, presumably because of the presence of an overwhelming force of the lactic acid bacteria.

But the moment milk is pasteurized, new conditions are set up. Pasteurization is not sterilization; in the former the heat process is not carried to the point of destroying all organic life. It has come to be generally understood that bringing a fresh milk to a temperature of 140° F. or 60° C. and maintaining it at that point for twenty minutes has the effect of destroying the nonspore-forming pathogenic microorganisms. Almost invariably, however, a few colonies of the lactic acid bacteria will remain, and, unless the newly pasteurized milk is then subjected to an intense cold, these organisms go on reproducing and acting in the direction that will eventually lead up to the "souring" of the milk. This newly pasteurized milk can be kept fresh almost indefinitely by low temperatures—say, 40° or under—and it will be wholesome and pure food for well people and for most children.

The great trouble with most pasteurized milk where trouble occurs is due to the fact that the pasteurization is postponed too long and until great numbers of toxins are formed. The pasteurizing process does not destroy the toxins, which are, of course, not demonstrable by microscopic or cultural methods, so that an aged milk pasteurized a long time after it is drawn may pass such tests, and yet may be the most dangerous of all, owing to its toxin content.

The sterilization of milk is a different process, and brings about new chemical and physiologic forms in the milk itself. At a temperature of 180° F., maintained for thirty minutes, milk becomes sterile—that is, the bacteria and cocci and all the yeasts and fungi will have been destroyed; further, albumins will have become coagulated and the caseins modified. That milk would be ideal for sick infants or any sick person but for the indigestibility of these altered proteins, and it is to break these up into assimilable form that we use in sterile milk for sick children, heat, plus a rennet, plus agitation; and it is this sterile milk that is mostly used for creating so-called formula milks prescribed and used in infants' hospitals. This takes us again into a technical field that does not come within our province, which is the description of milk to be administered in the home of the sick child after preparation by an untrained mother. A child that would require such a technical formulated milk would need to be in an institution possessing the facilities and the trained people necessary to its preparation and administration.

But we are now thinking about the sick child in the home, the child with whom whole milk or ordinary fresh milk does not agree; and we are thinking about the directions that the doctor may give to the mother of such a child for the preparation of a milk food, using the facilities of the home and the limited capability of the mother. It is not a difficult thing to prepare such milk, and it can

be prepared in an ordinary vessel, preferably a double-jacketed rice boiler, although an earthenware vessel will answer every purpose; the only other instrument needed is a thermometer that will register from 50° F. up to the boiling point, and the process itself is extremely simple. All the mother has to do is to place the milk, either whole or skimmed, according to the desires of the physician, in the vessel, place the thermometer in it and turn on the heat. After the thermometer goes to 140° F. or 60° C., the heat is turned down and that temperature, within two or three degrees, is maintained for twenty minutes.

While this process is going forward the mother is preparing a sufficient number of nursing bottles of a sufficient size to give the twenty-four hours of feeding; sometimes it will be only two ounces and the feedings will be an hour apart, sometimes it will be eight ounces and the feedings will be four or six hours apart.

These bottles are sterilized by boiling for, say, five minutes, and, if nipples are to be used, the nipples are also to be boiled in the same way, although the boiling process shortens the life of the rubber, so that they can be used for only a few times. The boiling of the rubber nipple for five minutes will destroy the rubber in about four or five such boilings.

As the pasteurization of the milk approaches completion, the mother must either put on rubber gloves, sterilized as the nipples have been treated, or she must be extremely careful, if using her bare hands, not to bring her fingers in contact with the mouth of the bottle or the edge of the vessel in which the milk is treated. When the pasteurization is completed as above, the hot milk is poured into the bottles, and the mother, with sterile hands or using sterile gloves, puts on the nipples.

The milk is now ready for the child's feeding, and can be kept in perfect condition until needed in a bucket of ice water or in packed ice, the entire bottle, excepting the neck and nipple, being immersed. A towel, that has been washed and boiled to sterilize it, is placed, preferably still wet from the sterilization, over the bucket, and is tied on. Better than this sterile towel would be a tight metal lid, which should have been cleaned in boiling water and put on immediately and without any attempt to dry it with a towel that may be unsterile.

When it is time for a feeding, the cover is taken off, and the mother, grasping the bottle in two fingers below the neck, lifts it out of the ice or water, sets it into a pan of hot water and leaves it there until it is about blood warm, or about 100° F. And so the child obtains its correct feeding.

Sometimes very sick children, especially those suffering from the summer enteric troubles, will not be able to take this milk, and it may be necessary to begin with teaspoonful feedings of sterile water,

repeated as often as ten or fifteen or twenty minutes. Presently a few drops of warm skimmed milk, pasteurized as above, can be added and gradually increased until the above prepared pasteurized milk can be retained.

We have attempted no scientific discussion in this brief paper. Our thought was merely to add somewhat to the resources of the busy practitioner who must make use of the very limited facilities in the home and the untrained assistance of his patient's mother.

STREPTOCOCCIC SORE THROAT ("GRIPPE") COMPLICATED BY ERYSIPELAS.

By ROY A. THORNLEY, M. D.,

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An article by Wohl and Detwiler, of Omaha, entitled "The Epidemic of Streptococcic Grippe and Its Relationship to Scarlet Fever" (INTERSTATE MEDICAL JOURNAL, XXIII, No. 9), prompted me to report the following case:

CASE I.

L., female, aged 32, married; occupation, nurse. Family history negative; parents living and well. Personal history negative, except for operation for appendicitis some years ago and an attack of cystitis three months previous. One week prior to onset of illness had finished attending an erysipelas case.

First seen by writer February 17 at 1 p. m. Temperature, 102°; pulse, 106; respiration, 24. Complained of sore throat, pains in back and limbs, headache, and feeling of general prostration. Examination of the throat revealed a dry, bright-red membrane, not unlike the angina of scarlet fever. Patient was sent to bed, an antiseptic gargle prescribed, and an ice collar applied to neck. A brisk purge was also administered and liquid diet given. At 8 p. m. the patient vomited for the first time, and this was a frequent distressing symptom throughout the acute phase of the illness. Temperature remained high, not falling below 102°, and vomiting persisted at intervals until the 19th, when it ceased. On the 20th, at 8 a. m., temperature was 103.6°; pulse, 90; and respiration, 23. A bright erythema of the nose was noted at this time. Within eight hours this had spread over both cheeks and up onto the forehead. Much edema was present, and patient was unable to see. A culture was taken from the throat and subsequently proved to be pure streptococci.

It was now evident that, in addition to the angina with its accompanying prostration, a typical erysipelas was also present. Tincture of iodine was applied to the affected area, extending 1 inch or more beyond the margins. Subsequent local treatment consisted in application of wet magnesium sulphate packs constantly. Frequent swabbing of the throat with silver nitrate solution, 10 percent, the internal administration of phenacetin and salol, and attention to the bowel were kept up.

Twenty-four hours after the culture sufficient growth had taken place for the pathologist to furnish me a streptococcic vaccine. This was administered daily. During the night of the 22d there was a distinct crisis, temperature the following morning being 98.8°; pulse, 85; and respiration, 21. The erythema was beginning to fade, edema much less, and a fine desquamation present on the nose. Patient almost immediately began to improve, and continued comfortable with a temperature ranging between 97° and 98° until March 1. At this time complained of pain and stiffness in the neck. Palpation of the right side of the neck disclosed an enlarged postcervical lymphatic, inflamed and very sensitive to the touch. March 3 fluctuation was present, and under local anesthesia an incision was made and the gland dissected out; in so doing the gland was ruptured. Drainage was provided, and for the next two days temperature was between normal and 100°. Convalescence was uneventful.

from this time on, although the neck healed slowly. Patient was discharged March 28.

Although the heart suffered, as would naturally be expected from such a toxemia, at no time were its tones such as to occasion a grave prognosis. The lungs remained free from involvement throughout the illness.

CONCLUSIONS.

1. A case with onset clinically corresponding to those of "streptococcic grippe."
2. Isolation of streptococci in pure culture from the throat.
3. Development of facial erysipelas as opposed to scarlatinal manifestations.
4. Suppurative adenitis.
5. Beneficial result of an autogenous vaccine in the treatment.

URINARY ABNORMALITIES AMONG THE INSANE.¹

By HOWARD T. CHILD, M. D.,

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Observation has shown that, while common infective diseases present a well-defined clinical form depending on the pathogenic agent concerned in their etiology, this particular is completely wanting in acute mental affections. The same toxin may produce very different form of psychosis. Just as acute alcoholic intoxication may produce exhilaration in one person, sullenness, melancholia, and weeping in another, so may toxic properties of urine and blood serum, as well as the presence of certain microorganisms in the blood, often coincide with the most diverse forms of insanity.

This paper, as its title indicates, will take up some of the abnormal conditions which we find in the examination of the urine among the insane, as well as the clinical symptoms associated therewith.

First and foremost, these people are not well; they are living in an entirely different environment from that to which they have been accustomed. Active men and women who, previous to their commitment, brought various muscles into action while performing their various duties, are apt to become merely automatons when placed in a state hospital. Their food is changed, and as a result certain changes must be undergone by the various organs which have to do with the secretions of the body.

Among the insane the following abnormalities may be considered:

1. Disturbances of micturition, frequently as a result of mental emotion.

2. Disturbances of micturition due to a diet which produces urinary irritation.

3. Dysuria, or painful urination, often of nervous origin, is to be contended with, especially in diseases of the spinal cord. We must eliminate prostatic congestion, cystitis, urethritis, and stone in the bladder when patient complains of this condition.

4. Retention of urine, or inability to completely empty the bladder. This condition is especially met with in paretics and senile psychoses. The degree of retention may be atony, paresis, or partial paralysis, where, from lack of muscular power, the bladder cannot well force out all the urine. Complete paralysis

¹Read before the Illinois State Hospital Medical Association, October 27, 1915, at Elgin, Ill.

exists on account of some brain or cord lesion and the bladder is incapable of expelling the urine. In atony and paralysis, however, the bladder may be distended to its utmost capacity, and the excess dribble away voluntarily or may be expelled by repeated acts of urination, accompanied by great straining and contractions of the muscular walls of the abdomen. We should at once determine whether the retention is due to any of three causes—(1) obstruction, (2) trauma, (3) paralysis—and give treatment accordingly. No condition in urinary diseases is so trying to those who have the care of the insane as urinary incontinence, and every means should be taken to discover and remove the cause. Changes in the amount of urine may be classified as polyuria, anuria, and oliguria.

Polyuria may be moderate or marked. The moderate form is due either to renal diseases, as chronic interstitial nephritis, amyloid kidney, reflex congestion, pyelonephritis, or tubercular kidney. Diabetes may be associated with the moderate form or, more often, with the marked. The latter class may be secondary to cardiac and hepatic diseases, but a great many arise from nervous causes. Among these we may enumerate hysteria, epilepsy, and exophthalmic goiter, disease of the hypophysis, etc. The condition may result reflexly from cerebral hemorrhage, meningitis, sclerosis of the cord, general paralysis of the insane, and mental strain.

Anuria is due to nervous causes, depending on a variety of conditions. Complete suppression has been found in hemiplegia, from fracture of the skull, but more frequently it is due to a reflex inhibition of secretion. For example, an irritation of one kidney can so affect the other reflexly that anuria will follow. This is seen in anuria after severe burns, and also after renal colic. Obstructive anuria may result from blocking the lumen of a ureter or kinking. The former is most common and found in renal calculus.

Oliguria, or a diminution of the quantity of urine, which is found in acute exacerbations of chronic nephritis, stasis of kidney as a result of heart disease, after anesthetics, and just before death. Changes occur in the character of the urine as noted in pyemia, cystitis of general paralysis, and the occasional hematuria found so often in prostatic inflammation, or renal stone, or in acute nephritis.

What does the clinical examination of urine taken from persons having a well-developed form of psychosis show? Instead of the usual transparency of urine, there may be cloudiness, as a result of either bacteria, phosphates, pus, or fat being present. These can be eliminated by heat and acetic acid, or potassium hydrate tests. The specific gravity permits one to gain a fair idea as to the amount of solids which are being secreted by the kidneys. A high specific gravity is found when an excess of nitrogenous food is ingested, after sweating, and muscular exertion. A low specific gravity with an absence of albumen and sugar means less urea. A decreased

amount of urine in late stages of nephritis and cardiac diseases, if of low specific gravity, means danger.

At the Kankakee State Hospital, in examinations embracing 1,000 specimens of urine, the following range was noted:

High specific gravity, maximum .....	.1036
High specific gravity, average .....	.1020
Low specific gravity, minimum .....	.1003
Low specific gravity, average .....	.1010

Albumen was found in 173 cases out of a series of 768 examined, or about 22 percent plus. The amount of albumen varied from a faint trace in 106 cases to strongly positive reaction in 63 cases. Associated with this, hyaline and granular casts were found in 59 cases and epithelial casts in 14, all of which show that some destruction of the kidney tissue was taking place.

The psychoses existing in the above-mentioned cases having albumen and casts are as follows: Dementia præcox stands first, with 25 of this number; general paralysis of the insane, 15; senile psychosis, 5; epilepsy, 3.

In the postmortem examinations we find a great many changes in the kidneys, chronic interstitial nephritis predominating. For the biennial period ending October, 1912, 18 deaths out of a total of 502 are recorded as due to that condition, while for the biennial period ending October 1, 1914, 23 deaths among a total of 624 are recorded as primarily due to this disease.

The urea output has been observed. The amount secreted has, of course, varied with the diet; a low output being associated with an exacerbation of the psychosis, together with a change in the physical condition of the patient, while other causes show an increase from a low to a high output, followed by some improvement in the mental condition of the patient.

My observations do not prove that glycosuria is any more prevalent in the insane than in those not afflicted, but, where it does occur, the mental symptoms are influenced by the amount of glycosuria present.

Cases in which a great deal of intestinal putrefaction occurs, as in epileptics, especially show an increase in the amount of indican eliminated by the kidneys.

The figures given above suggest that the foremost prevalent psychoses showing abnormal changes in the urine, in order of their prevalence, are: dementia præcox, general paralysis of the insane, senile psychosis, and epilepsy.

While education in regard to importance of moderate living in the prevention of nephritis may be possible, such efforts are not likely to prove of value among the insane; it is rather for the staff physician to take such precautions as are within his power and to watch for rise in arterial tension and for fall in kidney function.

DIAGNOSTIC AND THERAPEUTIC NOTES.

"CURED" SYPHILIS.—Warthin (*Am. Jour. Med. Sciences*, 1916, CLII, p. 508). Warthin believes that our notions regarding the curability of syphilis must be revised in the light of recent pathologic findings. Out of 41 cases, in which he found the spirochetes at autopsy, 11 had been regarded clinically as adequately treated and cured. In 25 cases a diagnosis of syphilitic infection had been excluded clinically because of the absence of symptoms and denial of previous infection.

Warthin believes that the heart and aorta of every latent syphilitic are involved in the infection, and that from the standpoint of life insurance latent syphilis becomes a medical and sociological factor of the greatest importance. Our present-day treatment seems to succeed only in rendering the infection latent rather than curing it. Clinical cures may not be cures at all, as shown by his autopsies. The absence of all symptoms, of all history of infection, and of a Wassermann reaction do not suffice to exclude the presence of a latent syphilis.

LATE HEREDITARY SYPHILIS.—Jeans (*Am. Jour. Dis. Child.*, 1916, XII, p. 374). Late hereditary syphilis in childhood always shows a positive Wassermann reaction. The father's blood serum, however, reacts positively in less than half the cases, the mother's somewhat more frequently. Rhagades, if definitely linear and not confined to the angles of the mouth, are pathognomonic of syphilis, and the same may be said of rapidly progressive deafness, without obvious destruction of the ear. Hutchinson's teeth, cranial bone disease, and corneal opacities are suggestive rather than conclusive for the diagnosis. The so-called "rheumatic pains" of syphilitic children, which may be of periosteal, bony, muscular, or nerve-root origin, are of diagnostic importance because they yield so promptly to specific medication.

THE RELATION OF THE PITUITARY BODY TO RENAL FUNCTION.—Motzfheldt (*Jour. Exp. Med.*, 1917, XXV, 153). An interesting property of the intermediate and posterior portion of the pituitary body is its ability to diminish the flow of urine. If in rabbits a free diuresis is produced by filling the stomach with water, the injection of a dilute solution of pituitary extract causes a prompt and marked diminution of the flow. This is true whether the pituitrin is given by mouth, subcutaneously, or intravenously. When the diuresis is due to the ingestion of salt, on the other hand, no such effect is produced. The action of the glandular extract seems to be upon the sympathetic nerve supply of the kidney, and to be independent of blood-pressure and vagus action. These experimental results suggest that the best therapeutic results in diabetes insipidus will be obtained by the continuous administration of posterior gland extract (pituitrin, pituglandol, etc.) and the simultaneous restriction of the salt intake. Extracts of the other ductless glands have practically no influence on the diuresis.

THE TREATMENT OF ACNE.—McDonnell (*Jour. Cutan. Dis.*, 1917, XXXV, p. 90). Acne, the writer believes, is due primarily to intestinal indigestion, the germs found in the lesions being accidental. Accordingly there can be no

specific for acne. Vaccine treatment may limit the formation of pus in the lesions, but can have no specific effect on the eruption.

Two factors must be considered as causative—eating fermentable foods and abnormal fermentation of the food eaten. Starches and sweets should be excluded from the diet, the teeth should be put in order, and the patient should chew his food thoroughly. Intestinal antiseptics may be tried. The author's prescription is aloin 0.10, ichthyl 10.00, licorice powder q. s., to be mixed and divided into 30 capsules, of which one is to be taken after each meal. Sunlight and fresh air are of great value, as is shown by the disappearance of the acne while the patient is out camping, though on an unrestricted and not always wholesome diet. Drying and peeling lotions, and the x-ray which has a similar action, have only a moderate and local value.

A SIMPLE DIETETIC TREATMENT IN DIABETES MELLITUS.—Williamson (Brit. Med. Jour., 1917, p. 154). When it is desired to render the urine of a diabetic sugar-free, without subjecting him to a period of fasting, the following diet may be tried:

8 a. m. Coffee or tea, with one tablespoonful of cream. One egg (poached, boiled, or buttered).

10 a. m. A glass of warm milk (half pint).

12 noon. Custard (prepared from one egg and half pint milk).

2 p. m. A glass of warm milk (half pint).

4 p. m. Tea, with one tablespoonful cream, one egg (poached, boiled, or buttered).

6 p. m. Cream, two tablespoonfuls, in half a pint of warm beef tea.

8 p. m. A glass of warm milk or one egg beaten up and added to half a pint of warm beef tea.

10 p. m. Cream, two tablespoonfuls, in half a pint of warm beef tea.

This dietary may be kept up for a week or ten days, during which time the patient remains recumbent and takes no other food. The glycosuria often ceases within a few days and usually within a week or ten days, says the author, in cases in which the ordinary rigid antidiabetic diet had proved unavailing. However that may be, the dietary appears to be rather pleasant and not unsuitable.

BOOK REVIEWS.

APPLIED IMMUNOLOGY. The Practical Application of Sera and Bacterins Prophylactically, Diagnostically, and Therapeutically. With an Appendix on Serum Treatment of Hemorrhage, Organotherapy, and Chemotherapy. By B. A. Thomas, A. M., M. D., Professor of Genitourinary Surgery in the Polyclinic Hospital and College for Graduates in Medicine, etc., and R. H. Ivy, M. D., D. D. S., Assistant Instructor in Surgery in the University of Pennsylvania, etc. Five colored inserts and 68 illustrations in text. Second edition revised. Philadelphia: J. B. Lippincott Company. Price, \$4.

In spite of, or perhaps because of, the enormous strides, experimental and clinical, made in recent years by serological and bacteriological research, the diffusion of exact knowledge of these matters among the medical profession at large is sadly insufficient. The average practitioner feels that here is a therapeutic measure, of wide applicability and mystic potency, without knowing anything definite about either its indications or its limitations and dangers. The result is that he has accepted as gospel the advertising literature put out by pharmaceutical manufacturers, literature in which scientific truth is made to yield at every point to a desire to exploit a product and increase the volume of its sales. Hence the need of a book, such as that of Thomas and Ivy, in which present-day ideas of immunology are set forth and explained with as little technical trappings as possible. The reader who desires to know in greater detail the researches on which the modern science of immunology is built is referred to the larger text-books; the practitioner who desires guidance in his daily work will find the little book invaluable.

STUDIES IN IMMUNIZATION AGAINST TUBERCULOSIS. By Karl Von Ruck, M. D., and Silvio Von Ruck, M. D. New York: Paul B. Hoeber. 1916. Price, \$4.

The very interesting work of the von Rucks with their tuberculosis vaccine has, for some time, been a subject of active and acrid discussion. Many experimenters had found that a vaccine, in order to produce a satisfactory degree of immunity against tuberculosis, must contain all the biologic products present in the bodies of tubercle bacilli. Koch himself was led by this consideration to substitute for his old tuberculin the products which he called B E and T R, and other experimenters have developed each his own method. The von Ruck vaccine consists of a watery solution of the tubercle bacillus proteids, with the addition of as much of the tubercle bacillus wax as can be used without producing necrosis at the site of injection. With this product they have obtained most interesting results, both in the laboratory and clinically. In the laboratory guinea pigs have been rendered immune to ordinarily fatal doses of tubercle bacilli, while clinically successful observations have been reported in large numbers both as regards prophylactic inoculation in children and therapeutic administration in active tuberculosis. It is true that a number of other careful workers have failed to confirm the observations of the von Rucks, but latter insist that this failure was due to the improper performance of the experiments and to improper clinical use of the vaccine. The special value of the von Ruck product is thus still subjudice, but since it is, at the worst, harmless if properly used, and, at the best, a valuable step forward in phthisis therapy, it deserves a trial on a large scale. The book should be read by everyone in the specific treatment of tuberculosis.

SURGICAL AND GYNÆCOLOGICAL NURSING. By Edward Mason Parker, M. D., F. A. C. S., Surgeon to Providence Hospital, Washington, D. C., and Scott Dudley Breckinridge, M. D., F. A. C. S., Gynæcologist to Providence Hospital, Washington, D. C. With 134 illustrations in text. Philadelphia and London: J. B. Lippincott Co. 1916. Price, \$2.50.

While primarily written for nurses, this volume cannot fail to prove of interest to the practitioner who is forced to perform operations in the private homes of patients. Many of the details of preparation for operation and of the after-care cannot be found in the regular text-books. Even the physician with hospital training may remain unacquainted with them, because, as a matter of routine, this part of the surgical work, as a rule, is in the hands of nurses.

MANUAL OF VITAL FUNCTION TESTING METHODS AND THEIR INTERPRETATION. By Wilfred M. Barton, M. D., Associate Professor of Medicine, Medical Department, Georgetown University, etc. Boston: Richard G. Badger. 1916. Price, \$1.50.

Barton has done a real service in collecting into one volume these various "function tests." Such large numbers of these tests have been advanced in the past few years, and they are scattered so widely through the literature, that their use by clinicians doubtless has been much restricted by their inaccessibility. This problem is solved in a masterly fashion by the present volume. Nor is it by any means an indiscriminating review of the literature, but a carefully compiled material selected with rare critical judgment. When possible, original articles are quoted, together with the more valuable subsequent investigations. A summary of the relative value of each test from the clinical viewpoint is given. Chapters are devoted to tests of the various vital organs, including heart function tests. The more valuable tests, such as the phenol-sulphonaphthalein test, and Marshall's test for blood urea are described in full so as to obviate the necessity of consulting special texts.

A TEXT-BOOK OF PRACTICAL GYNECOLOGY. For Practitioners and Students. By D. Tod Gilliam, M. D., Emeritus Professor of Gynecology in Ohio State University College of Medicine, and Sometime Professor of Gynecology Starling Medical College; Gynecologist to St. Anthony and St. Francis Hospitals, etc., and Earl M. Gilliam, M. D., Professor of Diseases of Women in the Ohio State University, College of Medicine, Columbus, Ohio, etc. Fifth revised edition. Illustrated with 352 engravings, a colored frontispiece, and 13 full-page halftone plates. Philadelphia: F. A. Davis Company. 1916. Price, \$5.00.

A work as popular as the one before us, appearing in its fifth edition, neither requires a detailed description of its scope and contents, nor calls for specific praise of its value. May it suffice to state that by numerous minor changes the author has brought his work thoroughly into accord with the most up-to-date teachings of gynecology.

A MANUAL OF PRACTICAL LABORATORY DIAGNOSIS. By Lewis Webb Hill, M. D., Graduate Assistant, Children's Hospital, Boston. With 11 figures and 8 plates—4 in colors. Boston: W. M. Leonard. 1916.

This little book is designed as a pocket guide to the more usual laboratory procedures. It will be particularly useful to student interns and house officers in their routine work. The author's method of performing the Widal reaction does not seem beyond reproach. He is profligate in his use of nitric acid in performing the Heller test. There is an evident misprint on page 85, "90 percent sodium chloride" for "0.9 percent."

CARE AND FEEDING OF INFANTS AND CHILDREN. A Text-Book for Trained Nurses. By Walter Reeve Ramsey, M. D., Associate Professor of Diseases of Children, University of Minnesota; Associate Visiting Physician to the University Hospital; Visiting Physician to St. Paul City and County Hospital; Medical Director St. Paul Baby Welfare Association, etc. Including Suggestions on Nursing by Margaret B. Lettice, Supervising Nurse of the Baby Welfare Association, St. Paul, Minn., and Nann Gossman, Nurse in Charge of Children's Department, University Hospital, Minneapolis, Minn. With 123 illustrations. Philadelphia and London: J. B. Lippincott Company. 1916. Price, \$2.

The physician of today is accustomed to leave many routine procedures of treatment to the nurse. With the increased efficiency of the trained nurse, largely due to text-books like the one before us, this custom in certain branches—*e. g.*, in pediatrics—has grown possibly beyond the limits of perfect safety. Both in hospital and private work the physician has developed the habit of simply ordering what shall be done. The resulting deficiency may prove most embarrassing under certain conditions. This little volume, replete with exact details concerning the care and feeding of infants, therefore, cannot fail to become a much appreciated addition to the library of the general practitioner.

THE HEALTHY GIRL. By Mrs. Joseph Cunning, M. D. (London), Hon. Med. Director to the Open-Air School in the London Botanical Gardens, and A. Campbell, B. A., Lecturer in Biology and Hygiene, Technical Institution, Swindon. New York: Oxford University Press. 1916. Price, \$1.75.

Misled by the title, the reader will be surprised but certainly not disappointed by the contents of this little volume. It represents a brief anatomy and physiology of the human body, written in plain and, as we wish to emphasize, attractive form, in language well adapted to the intelligence of the girl just leaving school. The healthy girl will find in this book much information, which, if properly applied, cannot fail to protect her against many of the preventable diseases.

PRINCIPLES AND PRACTICE OF PHYSICAL DIAGNOSIS. By John C. DaCosta, Jr., M. D., Associate Professor of Medicine, Jefferson Medical College, etc. with 243 original illustrations. Third edition, thoroughly revised. Philadelphia and London: W. B. Saunders Company. 1915. Price, \$3.50.

DaCosta's book treats the subject of physical diagnosis from the standpoint of the clinician. He does not indulge in vague theorizing, nor does he attempt to make facts fit theories, however consoling the result might be. As an instance, in describing the methods of determining the cardiac area by percussion, he shows the physical difficulties in the way of any accurate determination, and frankly admits that the best we can expect from this method is an approximation. The entire book partakes of this frank spirit, not in the tone of the ruthless iconoclast, but of the sane observer. The illustrations are particularly apt and well executed. It is needless to say that the newer clinical methods, such as electrocardiography and radiography, receive due attention. The student will not find a more generally useful book than this.

EMBRYOLOGY, ANATOMY, AND DISEASES OF THE UMBILICUS, TOGETHER WITH DISEASES OF THE URACHUS. By Thomas Stephen Cullen, Associate Professor of Gynecology in the Johns Hopkins University; Assistant Visiting Gynecologist to the Johns Hopkins Hospital. Illustrated by Max Broedel. Philadelphia: W. B. Saunders Company. 1916. Price, \$7.50.

His previous works on carcinoma and myoma of the uterus have established beyond cavil Cullen's rare ability of presenting exhaustive and scholarly studies on special subjects of interest to gynecologists and surgeons. In going over this volume of almost 700 pages, dealing with the anatomy and pathology of

navel and urachus, the reader can not escape the humiliating feeling of his very limited information concerning these structures in the face of the enormous amount of definite knowledge today available. A careful perusal of this remarkable work, encyclopedic in its scope, forces the deduction that, of necessity, certain anomalies and diseases of the urachus and especially of the navel must come almost daily under the observation of obstetricians and surgeons. That such conditions, in a fair percentage, heretofore have remained unrecognized and thus have failed to receive appropriate medical attention seems solely the result of the prevailing ignorance, now inexcusable that Cullen has enriched medical literature by this contribution.

THE MEDICAL CLINICS OF CHICAGO. Vol. I, No. 5, March, 1916. Published by-monthly. Philadelphia and London: W. B. Saunders Company. 1916. Price per year, \$8.

THE MEDICAL CLINICS OF CHICAGO. Vol. I, No. 6, May, 1916. Published by-monthly. Philadelphia and London: W. B. Saunders Company. 1916. Price per year, \$8.

THE MEDICAL CLINICS OF CHICAGO. Vol. II, No. 1, July, 1916. Published by-monthly. Philadelphia and London: W. B. Saunders Company. 1916. Price per year, \$8.

These numbers of the *Medical Clinic* contain several useful articles and a number which are of more or less passing interest. There is a lantern slide clinic by Dr. James T. Case on the Roentgenologic Aspects of Intestinal Stasis, which is of rather unusual interest and emphasizes the value of screen examinations as compared with plates. Hamburger reports his experience with the Allen treatment of diabetes and lays much stress on a list of sample dietaries. Unfortunately, however, sample dietaries are never more than samples, and no scheme can serve as a complete substitute for common sense and judgment.

THE PRIMARY LUNG FOCUS OF TUBERCULOSIS IN CHILDREN. By Dr. Anthon Gohn, O. O. Professor of Pathological Anatomy at the German University in Prague. English edition, authorized translation. By D. Barty King, M. A., M. D. (Edinburgh), M. R. C. P. (London and Edinburgh), Assistant Physician to the Royal Hospital for Diseases of the Chest, London; Physician to the Department for Diseases of the Chest, St. Pancras Dispensary, London, etc. With seventy-two text illustrations, one black and one colored plate. New York: Paul B. Hoeber. 1916. Price, \$3.75.

This monograph deals with the question of the site of the primary focus of tuberculosis in children. It embraces a series of 184 autopsies between the years 1907 and 1909. The lungs were in all cases searched carefully for macroscopic evidence of tuberculosis, and any evidence of a focus in any part of the body led to a careful macroscopic search of the lymphatic and respiratory systems. Microscopic examinations were not made. The author comes to the conclusion that an overwhelming majority, if not all cases, of childhood tuberculosis are respiratory with the primary focus in the lung, the involvement of the bronchial lymphatic glands being secondary. Foci in other parts of the body are also secondary to the lung focus in a large part, if not all, of the cases. The author is led to these conclusions by the fact that, whenever tuberculosis of the tracheobronchial lymph nodes was found, he was able, except in rare instances, to discover a primary focus in the lung in a region belonging to the same lymphatic area. In no case was it probable that the lymphatic tuberculosis was older than the lung focus. The same thing was true with tuberculosis in other parts of the body. A primary focus in the lung, the age of which was at least that of the lesion in the other part, was always found. Taking into consideration the fact that Gohn searched for the primary focus

in the lung by macroscopic methods, the small number of cases in which he failed to find such area can easily be accounted for by the limitations of this method. He considers the question of an infection through the lung without the formation of a primary focus, but rejects this as improbable, and prefers to attribute his few failures to find a primary focus in the lung as due to the coarseness of the technic. The tuberculin test had been made on all the children who came to autopsy. A reaction was invariably positive when tuberculosis could be demonstrated postmortem. The author therefore concludes that the reaction is specific. The monograph should be read by everyone who is interested in the tuberculosis question.

THE AMERICAN YEAR-BOOK OF ANESTHESIA AND ANALGESIA. By Various Contributors. F. H. McMechan, A. M., M. D., Editor. Quarto, art buckram, India tint paper. With 420 pages and 250 illustrations. New York: Surgery Publishing Company. Price, \$4.

This year-book merits not only cordial, but hearty support. It purposes to "collate the world's ultrascientific researches" on anesthesia. A purpose framed so grandiloquently is very likely to cause the staid reader of science to shy a bit; but, if he will "hold fast" through the preface and through some of the preliminary advertising pages, he will find waiting for him, in the body of the book, much valuable information regarding the later investigations of the anesthesia problem. Gatch, Crile, Mann, Lillie, Hogan, Gwathmey, Hertzler, Hirschman, and Wilfred Harris, are among the contributors, and this alone testifies both to the high scientific tone and interest of the volume.

There are in all 31 papers, covering a remarkably wide range of topics in the field of anesthesia. Indeed, it is this wide range of selection which speaks so prophetically for the future of the American Year-Book of Anesthesia. It is safe to say that if, year after year, equally excellent volumes are issued, every man will find it possible to equip himself bibliographically with all the essentials for a thorough understanding of the practical and fundamental advances in the field of anesthesia.

PHYSICS AND CHEMISTRY FOR NURSES. By Amy Elizabeth Pope, Graduate of the School of Nursing of the Presbyterian Hospital, City of New York; Special Diploma in Education from Teachers College, Columbia University, New York; Formerly Instructor in the School of Nursing, Presbyterian Hospital; Instructor in the School of Nursing, St. Luke's Hospital, San Francisco, Cal. Author of "Quiz Book of Nursing," G. P. Putnam's Sons. 1916. Price, \$1.75.

The present volume aims to give the student nurse an understanding of the fundamental principles involved in the various household procedures, such as cooking, the preservation of foods, the science of nutrition, etc. It likewise attempts to explain the physics of the stethoscope and radioactivity. It is therefore a sort of combination cookbook, chemistry, and physics in one. The reviewer doubts very much whether there is any such "condensed" path to knowledge.

PHARMACOLOGY AND THERAPEUTICS. For Students and Practitioners of Medicine. By Horatio C. Wood, Jr., M. D., Professor of Pharmacology and Therapeutics in the University of Pennsylvania; Second Vice-Chairman of the Committee of Revision of the United States Pharmacopeia. Second edition. Philadelphia J. B. Lippincott Company. Price, \$4.

In its day, Woods' Therapeutics was the leading text-book in its field. The progress of medical science, however, soon left it sadly in the lurch, and its admirers have been wondering why a new edition, strictly up to date, did not appear. In some respects the new second edition is somewhat disappointing.

What the author says is always clear, true, and to the point. The omissions are, however, such as sadly to impair the book's value. Thus the discussion of the more valuable of the recently discovered synthetics is insufficient; emetine is not much more than mentioned and its dosage is incorrectly stated; nothing is said of the dangers inherent in the intravenous use of strophanthin; the chapter on salvarsan might have been written five years ago. The book is at its best in the discussion of the old galenicals.

DISEASES OF THE DIGESTIVE TRACT AND THEIR TREATMENT. By A. Everett Austin, A. M., M. D., Former Professor of Physiological Chemistry at Tufts College, University of Virginia, and University of Texas; Present Assistant Professor of Clinical Medicine, in Charge of Dietetics and Gastrointestinal Diseases, Tufts College, etc. With eighty-five illustrations, including ten color plates. St. Louis: C. V. Mosby Company. 1916.

Dr. Austin brings to his work as gastroenterologist an unusual equipment. For many years he was a physiological chemist, teacher of this branch in several medical schools, and author of one of the best manuals on the subject. His book on "Diseases of the Digestive Tract" shows clearly the marks of his training. The refinements of diagnosis, both clinical and laboratory, are discussed lucidly and completely. The field of therapeutics, especially its dietetic side, is covered equally well. Pathological anatomy, perhaps, suffers a little by comparison, but that is hardly a fault in a book intended for the general practitioner. All in all, Dr. Austin's book may be commended to those who seek a clear and critical presentation of this most difficult subdivision of internal medicine.

PLAGUE. Its Causes and the Manner of Its Extension—Its Menace—Its Control and Suppression—Its Diagnosis and Treatment. By Thomas Wright Jackson, M. D., Member American Red Cross Sanitary Commission to Serbia, etc. With Bacteriologic Observations. By Otto Schoebl, M. D., Bureau of Science, Manila. Illustrated. Philadelphia: J. P. Lippincott Company. 1916

When an author prefaces a book with an apology, he prepares the reader, as a rule, for something for which no apology is required. Jackson, however, in spite of an introductory apology, has in his book on Plague presented a volume which is most acceptable—not only from the viewpoint of subject matter, but also from the viewpoint of interest and style. He sets forth chiefly the historical, hygienic, and prophylactic aspects of the disease. He intentionally avoids the consideration of the pathology, and reviews only briefly the diagnosis and treatment. He has drawn chiefly on his personal experiences during the epidemics in Manila, and it is this personal touch which adds fascination and even charm to a medical subject. The make-up of the book—paper, type, index, and illustrations—allow of no criticism.

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EDITORIAL.

MEDICAL MOBILIZATION.

We are publishing in the editorial columns of this number of the INTERSTATE, information as to the machinery at present available for the organization of medical preparedness for the war. We ask our readers to pay very special attention to this memorandum, so that they may clearly understand the correlation of the different parts of the machine of which we may each be called on to become, if not a great driving wheel, a necessary cog on some pinion.

There are, practically, three phases of medical participation in preparedness. Those who have the necessary high training and sound health and who are of the right age will find an attractive and distinguished career in the regular medical corps of the army. A second category of physicians should enroll themselves, if their health and other circumstances permit, in the medical section of the Officers' Reserve Corps. Their task in this case is simplified, for their duties will be allotted to them by military authorities.

A more difficult and a more complex problem awaits those who for any reason are not in a position to adopt either of these two alternatives. It will be their duty, as doubtless it will be their desire, to do everything in their power, not only to persuade their eligible colleagues to enter one or other of these organized corps, but to encourage them in doing so by helping to remove the obstacles that stand in the way of the practitioner desirous of placing his services at the disposal of his country.

Greatest among these difficulties is, of course, the fear that a practice, built up by patient work, will be dissipated during the absence of the practitioner. The surgeon-general has called on the local medical organizations and, in particular, the county medical societies to take this matter in hand and to arrange for the maintenance of the practices of those who are serving with the colors. Such an arrangement has been found quite feasible on the other side

of the Atlantic, and, although practices are admittedly less defined in this country than in the United Kingdom, we feel sure that the Government may in this respect depend on the loyalty of the profession to its country and to its colleagues.

While it will be necessary, here as elsewhere, to establish conventions and lay down rules for the regulation of these matters, it will generally be found that, properly applied, the Golden Rule will suffice to solve all doubtful cases.

MEDICAL PREPAREDNESS.

Under existing conditions it is desirable that every physician as well as every other loyal citizen of America should be prepared to render active service to the Federal Government, remembering that the protection afforded by the Government has made it possible for its citizens to enjoy liberty, peace, and prosperity. The avenues through which the most effective service can be rendered by members of the medical profession have taken definite and concrete form. Briefly, the plan is that all medical activities should co-operate with the Council of National Defense. It seems desirable, therefore, at this time to state explicitly just what the Council of National Defense and its various agencies are. The Council of National Defense was created by act of Congress, August 29, 1916:

"Sec. 2. That a Council of National Defense is hereby established, for the coordination of industries and resources for the national security and welfare, to consist of the secretary of war, the secretary of the navy, the secretary of the interior, the secretary of agriculture, the secretary of commerce, and the secretary of labor.

"That the Council of National Defense shall nominate to the president, and the president shall appoint, an advisory commission, consisting of not more than seven persons, each of whom shall have special knowledge of some industry, public utility, or the development of some natural resource, or be otherwise specially qualified, in the opinion of the council, for the performance of the duties hereinafter provided. * * *

"That the Council of National Defense shall adopt rules and regulations for the conduct of its work, which rules and regulations shall be subject to the approval of the president, and shall provide for the work of the advisory commission to the end that the special knowledge of such commission may be developed by suitable investigation, research, and inquiry and made available in conference and report for the use of the council; and the council may organize subordinate bodies for its assistance in special investigations, either by the employment of experts or by the creation of committees of specially qualified persons to serve without compensation, but to direct the investigations of experts so employed."

A committee of physicians was asked to present to the president names of medical men suitable for membership on the advisory commission. Dr. Franklin H. Martin, of Chicago, was selected.

The following statement was issued by President Wilson October 11, 1916, in announcing his appointment of the civilian advisory members of the Council of National Defense:

"The Council of National Defense has been created because the Congress has realized that the country is best prepared for war when thoroughly prepared for peace. From an economic point of view there is now very little difference between the machinery required for commercial efficiency and that required for military purposes.

"In both cases the whole industrial mechanism must be organized in the most effective way. Upon this conception of the national welfare the council is organized in the words of the act for 'the creation of relations which will render possible in time of need the immediate concentration and utilization of the resources of the nation.'

"The organization of the council likewise opens up a new and direct channel of communication and cooperation between business and scientific men and all departments of the Government, and it is hoped that it will in addition become a rallying point for civic bodies working for the national defense. The council's chief functions are:

"1. The coordination of all forms of transportation and the development of means of transportation to meet the military, industrial, and commercial needs of the nation.

"2. The extension of the industrial mobilization work of the Committee on Industrial Preparedness of the Naval Consulting Board and complete information as to our present manufacturing and producing facilities adaptable to many-sided uses of modern warfare will be procured, analyzed, and made use of.

"One of the objects of the council will be to inform American manufacturers as to the part which they can and must play in national emergency. It is empowered to establish at once and maintain through subordinate bodies of specially qualified persons an auxiliary organization composed of men of the best creative and administrative capacity, capable of mobilizing to the utmost the resources of the country.

"The personnel of the council's advisory members, appointed without regard to party, marks the entrance of the nonpartisan engineer and professional man into American governmental affairs on a wider scale than ever before. It is responsive to the increased demand for and need of business organization in public matters and for the presence there of the best specialists in their respective fields. In the present instance the time of some of the members of the Advisory Board could not be purchased. They serve the Government without remuneration, efficiency being their sole object and Americanism their only motive."

As indicated above, the Council of National Defense therefore consists of six members of the Cabinet as follows: the secretary of war, chairman; the secretary of the navy, the secretary of the interior, the secretary of agriculture, the secretary of commerce, and the secretary of labor.

The advisory commission of the Council of National Defense consists of seven civilians appointed by the president. The members of the Advisory Commission are as follows: Mr. Daniel Willard, president of the Baltimore and Ohio Railroad, chairman; Mr. Hollis Godfrey, LL. D., president of Drexel Institute, Philadelphia, Pa.; Mr. Howard E. Coffin, of Detroit (who is also chairman of the Com-

mittee on Industrial Preparedness of the Naval Consulting Board); Dr. Franklin H. Martin, of Chicago; Mr. Bernard Baruch, financier, of New York; Mr. Julius Rosenwald, vice-president of Sears, Roebuck & Co., of Chicago; Mr. Samuel Gompers, president of the Federation of Labor.

The two bodies meet in joint session at frequent intervals for the purpose of considering problems relating to national defense.

The executive activities of the Council of National Defense are coordinated and carried out through the medium of the director of the Council of National Defense, Mr. W. S. Gifford, and the chiefs of the various departments represented by the members of the Advisory Commission. Dr. Frank F. Simpson is chief of the Medical Section of the Council of National Defense.

THE ADVISORY COMMISSION.

The organization of the council and of the Advisory Commission provides that each member of the Advisory Commission shall gather about himself for the most effective coordination of the activities he represents a committee or board consisting of representatives of governmental departments on the one hand and civilian members on the other hand.

The Medical Committee, of which Dr. Franklin H. Martin is chairman, consists of Wm. C. Gorgas, surgeon-general of the U. S. army; Wm. C. Braisted, surgeon-general of the U. S. army; Rupert Blue, surgeon-general of the U. S. Public Health Service; Colonel Jefferson R. Kean, director-general of military relief of the American Red Cross; Dr. Wm. H. Welch, member of the National Council of Research; Dr. Wm. J. Mayo, chairman of the Committee of American Physicians for Medical Preparedness; Dr. Frank F. Simpson, chief of the medical section of the Council of National Defense, and secretary of the Committee of American Physicians for Medical Preparedness.

Many medical problems which have bearing on the national defense are considered by Dr. Martin's committee and by the Advisory Commission and the Council of National Defense before being put into action by the governmental departments concerned.

COMMITTEE OF AMERICAN PHYSICIANS FOR MEDICAL PREPAREDNESS— ITS COMPONENT PARTS.

National and State Committees.

In April, 1916, the national committee was appointed by the joint action of the presidents of the American Medical Association, the American Surgical Association, the Congress of American Physicians and Surgeons, the Clinical Congress of Surgeons of North America, and the American College of Surgeons. To that com-

mittee was delegated the responsible duty of formulating plans whereby the civilian medical resources of the United States might be ascertained and effectively coordinated for such purposes as might be required by the Federal Government.

The national committee organized, selected a chairman and secretary and an executive committee, and appointed a state committee of nine strong men in each state of the Union.

It is the fixed policy of this committee that all presidents and secretaries of the various state medical societies shall be members of their respective state committees during their incumbency in office. From the first it was contemplated that at the proper time the organization of committees would be perfected in each county of the country. That time has now come and county committees are being rapidly organized.

In each instance the state committees are expected to select the county committees and to supervise their formation.

Name and Personnel of County Committees.

It is the fixed policy of the Committee of American Physicians for Medical Preparedness that the various important medical interests and activities of each county shall be represented on the county committees. This is done for the purpose of coordinating the important interests and activities, so that the medical profession of the nation may present a compact and effective organization for the purpose of aiding effectively in the national defense. In order that this plan may be carried out with uniformity and precision throughout the country, the various state committees have been requested to have all county committees bear the following distinguishing name, to wit, the Auxiliary Medical Defense Committee of _____ County, in _____ state. The state committees have also been requested to provide that the county committees shall include the following in their list of members:

1. All members of national committee of the Committee of American Physicians for Medical Preparedness resident in the individual county.
2. Members of the state committee resident in or near the individual county.
3. Representatives of the U. S. army resident in the individual county.
4. Representatives of the U. S. navy resident in the individual county.
5. Representatives of the U. S. Public Health Service resident in the individual county.
6. Representatives of the State Board of Medical Examiners residing in the individual county.
7. Representatives of the state or city Public Health Service.
8. Ranking medical officer of the National Guard.
9. President and secretary of the local Medical Officers' Reserve Corps Association, if there should be such an organization.
10. Deans of medical schools.
11. President and secretary of the County Medical Society.

12. President and Secretary of any other important medical societies.
13. Medical director of the local Red Cross Units.
14. Other representative medical men.

Duties of County Committees.

From time to time specific duties will be assigned to the various state and county committees. These duties will be in accord with the policy of the Council of National Defense, and should be executed promptly and precisely by those who are called on to cooperate in this manner with the Council of National Defense.

The committees will call to their assistance those who have been appointed field aides by their various state committees and such other physicians as they may desire to have cooperate with them.

Among the specific duties which the county committees are requested to perform at this time are the following:

First. That these committees cooperate with the national and state committees of the Committee of American Physicians for Medical Preparedness in their efforts to gain needful information regarding the civilian medical resources of their own communities, and in their efforts to coordinate civilian medical activities for prompt mobilization in case of need.

Second. That they secure applicants:

(a) For the Army Medical Corps. If the president should call the full complement of troops already authorized by Congress, the regular army would need about 1,200 additional medical officers. If a 1,000,000 men should be called, a corresponding increase would be required.

(b) For the Medical Officers' Reserve Corps. If war should come, 20,000 to 30,000 medical reserve officers should be enrolled.

(c) For the Naval Medical Corps, which needs about 350 additional officers.

(d) For the Coast Defense Reserve Corps of the Navy. Several hundred high-class reserve medical officers are desired.

(e) For the National Guard, such numbers as may be required to bring your local National Guard to full strength.

In the preparation for national defense the first thing needed will be medical officers. Physicians recommended for such service should be of the highest type. They should be free from suspicion of addiction to drugs or drink. Medical officers who go to field duty should by preference be under the age of 45.

Third. That they cooperate, individually and collectively, with the Medical Department of the army, navy, and Public Health Service and with the Council of National Defense.

Fourth. That they cooperate with the Red Cross in their efforts to bring that organization to the highest point of efficiency.

Activities Accomplished and in Progress.

On April 20, 1916, the Executive Committee of the Committee of American Physicians tendered the services of the committee to the president of the United States. He expressed himself as being pleased with the patriotic tender of services, and regretted that existing laws did not permit the acceptance by the Federal Government of gratuitous services, but stated that the matter would be referred to the secretary of war and the secretary of the navy for the purpose of devising plans by which the good offices of the medical profession could be accepted and utilized to the best effect by the Federal Government. He further stated that the plans would be referred to the Committee of American Physicians for comments and suggestions. The Executive Committee was permitted to make suggestions regarding the bill creating the Council of National Defense.

During the last year this committee and its various subsidiary bodies have been actively engaged in formulating and carrying out various activities in conformity with the general plans for national defense which have been undertaken by the Federal Government.

The splendid work done by the various state and other committees was of such extent and value that the Council of National Defense at its first meeting requested the Committee of American Physicians to continue their various activities under the guidance of the Council of National Defense, and asked the secretary of the Committee of American Physicians to act as chief of the Medical Section of the Council of National Defense. Since that time the various activities have gone forward with renewed energy.

Some of the activities which have either been completed or are well under way follow:

1. Some 20,000 medical men selected from all parts of the country have been classified according to the training and the kinds of work which they do best.

2. An inventory of hospitals and other medical institutions is well under way.

3. It has been the fixed policy of the Committee of American Physicians to aid the American Red Cross in bringing its medical department to the highest point of efficiency. With that object in view, and in order to foster the spirit of cooperation, the members of the National Committee of the Committee of American Physicians accepted invitations to become members of the national committee of the medical department of the American Red Cross. In order further to promote the harmonious cooperation of the two organizations, most of the members of the various state committees of the Committee of American Physicians were also made members of the

state committees of the American Red Cross. The various county committees will also be expected to cooperate in carrying out the plans of the two organizations.

4. The establishment of military training for senior medical students in a large percentage of the high-grade medical schools of the country.

5. The establishment of more effective military training for hospital groups for members of the Medical Officers Reserve Corps, for dental students, and others.

6. The appointment of a committee for the standardization of medical and surgical supplies and equipment. The purpose of this work is to designate a list of articles essential to the successful conduct of civilian and military medical and surgical activities, so that, in the event that it should become necessary to curtail production, all of the energies of the drug and instrument makers would be devoted to necessary articles rather than to those which are desirable but not essential. On this standardization committee are representatives of the army, the navy, the Public Health Service, the Red Cross, the Council of National Defense, and a number of the most distinguished members of the various specialties of civilian medicine. In their work of coordination and standardization this committee will take council with the manufacturers of the various supplies under consideration.

7. Much valuable information supplied by medical and other observers who have worked in the war zones of Europe is being gathered and classified.

8. The presidents of important national medical organizations of the country have been requested to suggest to the medical section of the Council of National Defense the kinds of work which members of those organizations are best fitted to perform, and to suggest plans whereby their activities and resources might be utilized to best advantage. This request does not contemplate an inventory and organization of these resources. The purpose is that, having received suggestions offered by the various organizations, those suggestions will be maturely considered, and such as conform to the plans of the Council of National Defense and can be utilized to advantage will be adopted. The various organizations will, in that case, be requested to cooperate fully and promptly in perfecting the plans of the Council of National Defense.

The foregoing memorandum embodies only a very small percentage of the problems now under consideration. It is neither wise nor desirable, however, to present them in detail at this time.

THE WAX DRESSING OF BURNS.

It is an ill wind that blows no one good, and, whatever may be thought of the somewhat petulant, unfair attitude of our distinguished lay contemporary, *The Outlook*, toward the *Journal of the American Medical Association* in the controversy about the miraculous results credited to the Ambrine treatment by a highly credulous correspondent of the former, this discussion has led to good results. In the first place, the Ambrine producers have been forced into the open and have abandoned secrecy. They have shed all the nonsense about the exquisite difficulty of manufacturing this article, and we hear no more of the years of patient and unrewarded self-sacrificing research of the inventor. Having obtained a gratuitous advertisement from *The Outlook*, they are naturally anxious to profit to the utmost thereby, but they find their commercial interests menaced by the discovery of substitutes for Ambrine which are said to give even better results than the latter.

As there is more rejoicing for a repentant sinner than for one who never went wrong, so we may suppose that, if the Ambrine people in the future tread the narrow path of righteousness in their publicity, they may hope to enter the proprietary paradise, to be written on the role of the "*New and Non-Official Remedies*."

Ambrine, it appears, is nothing but paraffin wax containing 5 percent of oil of amber. This is probably intended to represent its present composition. In the past it seems to have contained resins. One writer states that cedar oil is as good as and cheaper than oil of amber for rendering the paraffin wax ductile. Lieutenant-Colonel A. J. Hull, R. A. M. C., stated in the *British Medical Journal* of January 13 that the results obtained by a mixture of home manufacture in a military hospital have surpassed those obtained by the use of any other preparation. He gives the following formula for its preparation: resorcin, 1 percent; eucalyptus oil, 2 percent; olive oil, 5 percent; soft paraffin, 25 percent; and hard paraffin, 67 percent. The hard paraffin is first melted and the soft paraffin and olive oil are stirred in. The resorcin is next added, dissolved in half its weight of absolute alcohol, and, finally, the eucalyptus oil when the wax has cooled to about 55° C. (133° F.) If necessary, the resorcin may be replaced by a quarter of its weight of beta-naphthol. Colonel Hull adds that the application of this No. 7 paraffin, as it is called, to ulceration following frost-bite has been as successful as in the case of burns.

With regard to the application, the melted wax can be sprayed on with a suitable instrument, or it may be painted on with a camelhair brush, the former method being used for highly sensitive surfaces. The burn seen immediately after its infliction will usually be aseptic, and the wax may be immediately applied. Where the

surface is infected it is desirable, and when it is foul it is necessary to clean it. For this purpose washing with Dakin's fluid has been found suitable. When the surface is cleaned up, it should be dried, preferably by the use of hot air, before the application of the wax dressing. The application seems to be almost painless, and there is little doubt that this method in appropriate cases is one of the best that has hitherto been discovered for covering of burns and widely denuded surfaces. The newer substitutes are said to be freer than the original product from a tendency to promote the accumulation of foul discharges under the wax coating.

COLLECTIVE ABSTRACTS

BONE GRAFTING.

By M. G. SEELIG, M. D., of the Editorial Staff.

The subject of bone grafting is one of unusual interest, both from the academic and from the practical point of view, but not its least interesting phase lies in the fact that there is a striking analogy between the chapter on bone grafting and that on vaccination for smallpox. In both instances we have a well-established—a so-called standardized—technic, in both instances we attain by our procedures highly satisfactory therapeutic results, and yet in both instances we are not in possession of important underlying and fundamental facts. The immunity furnished by vaccination is not understood, and the role played by transplanted bone is still a subject for debate. We know, for example, that when it is necessary to perform a bone grafting operation, we may count on success with fair assurance, provided we use an autogenous graft. Success is doubly assured if the graft carries with it more or less periosteum, endosteum, and marrow, and if it is placed in contact with normal bone. On the other hand, we do not know why any of these factors are essential to success, nor do we know the physiological processes underlying a successful "take;" we do not know, furthermore, what part the individual bone elements, or the graft as a whole, plays in the process of healing in.

Macewen, Murphy, Gallie, Delbet, and others assert that the periosteum has no bone producing power, and is merely a limiting membrane. These authors believe that the essential bone cells are the factors in the growth of the graft. Other investigators, chief among whom was Barth, believe that new bone is built up around the implanted graft from the growing connective tissue which surrounds the graft. Still others have attempted to prove that the graft plays a passive role, serving merely as a trellis or supporting frame work, into which new bone grows from the neighboring healthy bone in contact with the graft. The late John B. Murphy held strongly to this view. By all odds the largest and most imposing group of investigators hold that the main factor in osteogenesis is the periosteum, and to a less marked degree the endosteum and marrow. Axhausen, Lexer, Phemister, McWilliams, and Albee are all adherents to this doctrine.

It is readily seen, therefore, that we are forced to approach the subject of bone graft with an open mind as far as fundamentals are concerned. Even the most careful analysis of the protocols of the various investigators does not enable one to practice independent critique. Undoubtedly refinements of experimental technic play a very important role, and it is impossible to properly evaluate these refinements by reading protocols. Take, for example, one small question in point. Is it or is it not possible to strip periosteum from cortex without carrying along with it a few cortical osteoblasts? If this is not indubitably possible, how is one to judge of the osteogenetic power of periosteum? How can Macewen and Brown and Brown be sure that in stripping off the periosteum they have secured the inner layer, which is ordinarily responsible for the so-called appositional growth of bone? And if they are not sure, then

how can they be certain of the correctness of their conclusion that periosteum has no osteogenetic function?

In a collective abstract of fairly brief compass it is sufficient to hint at these complexities; to do more than this would in all probability serve to confuse the reader. Those who wish to go deeper into the subject will find unlimited opportunity to do so by consulting the admirable resume by McWilliams in the January, 1916, number of *Surgery, Gynecology, and Obstetrics*, and he will find some additional information in the two volumes, "Bone Graft Surgery," by Albee, and "Autoplastic Bone Surgery," by Davison and Smith. No one has done better work in the field of bone grafts than McWilliams, who summarizes his general conclusions as follows: "Were the blood supply perfectly restored in the bone of a living graft, then it is evident that the graft would not die and would not become absorbed. But this is not the case, as the physical properties of bone prevent the absorption of blood sufficient to maintain the life of the bone until the vascular circulation is reestablished; consequently more or less of the bone dies. Undoubtedly many of the bone cells on the surface survive, while the deeper ones die. In any case, it is a varying question as to how many of the cells actually survive."

The inner layer of the periosteum, the endosteum, and, to a much less, if not negligible, extent, the lining of the Haversian canals provide the cells for osteogenesis in bone repair, to which may be added the comparatively few bone cells in the graft itself which survive. Of these the periosteum is much the more important, probably doubling the combined powers of all the other elements. This relation McWilliams found to be as follows: Every graft (26 in number) made by the author *with* periosteum lived, while with 38 grafts *without* periosteum but 21 (33 percent) survived. Of these grafts, made without periosteum, the new bone must have come either from the endosteum, or the lining of the Haversian canals, or the surviving cells of the graft itself, or all combined, leaving out of account the surrounding connective tissues.

If this be true, then, the relative importance of the periosteum, as compared with the combined powers of the endosteum, the lining of the Haversian canals, and the surviving bone cells, is as 100 to 55. The author has made four human transplantations *without* periosteum, all of which healed by primary union. In not one of these did the graft survive, all gradually becoming absorbed by molecular disintegration. In each of these transplants, without periosteum, there was endosteum (three being made with entire sections from ribs, and the fourth being taken from a section of the tibia with endosteum on it), together with bone cells and Haversian canal linings. Consequently from this we see that the periosteum is a very important structure in osteogenesis and bone graft repair. Of the few reported successful bone transplantations made without periosteum, the influence of the endosteum has not received sufficient attention, although its power of osteogenesis is far inferior to that of the periosteum."

Let him who can, reconcile these conclusions with the following ones of Brown and Brown, whose work seems to be admirably painstaking and well checked:

"1. We have been unable to reproduce bone from free periosteal transplants into the subcutaneous tissue or muscle.

"2. We have been unable to reproduce bone in the periosteal flap raised, left in contact with the bone, passed through the muscle, and again contacted with the periosteum, with the one single exception where there was a small nodule of bone, formed apparently in the free end of the flap, corresponding to another nodule formed on the shaft of the bone opposite, leading us to believe that the bone on the tip of the free periosteal flap was another osteoblast raised from the corresponding area on the shaft of the bone, and also because no bone had formed anywhere else in the flap.

"3. We have been unable to reproduce a bone in a single experiment from free bone transplants, without periosteum, into the subcutaneous tissue and muscle, regardless of the age of the transplant. Absorption was the rule in every case.

"4. We have been unable to reproduce bone in a single experiment where the bone was transplanted free, periosteum left intact, into the muscle or subcutaneous tissue. These transplants were uniformly absorbed.

"5. We have been uniformly able to reproduce bone, when transplanted and contacted with living bone, if it were in position where it had a function to perform, except in one experiment, where the transplant was only nine days old.

"6. Other necessary conditions being present for its reproduction, bone reproduces bone without the aid of periosteum.

"7. Our transplants that were contacted with living bone, and had no function to perform, were inclined to absorption.

"8. While periosteum may be an aid to the life and growth of bone, we have not been able to prove in any experiment that it was at all essential."

These conclusions of Brown and Brown's are important, not for the reason that they vary so diametrically from the conclusions of McWilliams, but rather because they introduce the very important element of *function*. As far as one is safe in drawing deductions from clinical experience, it certainly seems to be a well-established fact that the elusive element of function does play a more important role in bone grafting than is accorded it by most investigators. Phemister also has emphasized this point, referring the phenomena of progressive or regressive changes in the transplant back to Roux's law of functional adaptation.

Brooks has attacked the problem from a novel point of view, utilizing the phenomena of intravital staining. This experimental work has not yet been published, but I am indebted to Dr. Brooks for the following abstract of his method and results:

"It has been demonstrated that sodium alizarine sulphonate, when given to animals either by mouth or subcutaneously, has specific vital staining properties for bone. The dye stains all newly formed bone a bright red color, and does not stain fully developed bone tissue at all. This method gives the investigator a means of determining the site and amount of new bone which is formed in a given length of time.

"This method has been applied to the study of the healing of defects in bone following the use of autotransplants of bone with periosteum and endosteum, cortical bone alone, and implants of dried sterile bone. Also homotransplants are being studied. The experiments are yet incomplete, but the value of the experimental method has been demonstrated.

"It has been shown that following the autotransplantation of bone with periosteum and endosteum the transplant may be the source of bone-forming tissue. In no instance has it been observed that new bone formed from an autotransplant if periosteum and endosteum were completely removed. Also implants of dead bone have not led to the formation of bone from the surrounding connective tissue. It is particularly interesting that homotransplants, under certain conditions, have been successful. It seems that the age of the animal is a very important factor in determining the osteogenetic properties of bone tissue."

As unfortunate as are the discrepancies in the experimental work underlying bone graft surgery, just so fortunate is the unanimity of opinion both as regards the specific indications calling for bone grafts and the very definite technic governing this branch of surgery.

The general indications are probably best stated by Albee in his book already mentioned:

1. To immobilize and stimulate osteogenesis in certain tuberculous joints.
2. To repair traumatic bone injuries.
3. To replace bone destroyed by infection.
4. To supply bone congenitally absent.
5. To strengthen or replace bone weakened or destroyed by benign or malignant growths.
6. To correct congenital or acquired deformities of the face.
7. To establish joints congenitally absent and restore those destroyed by disease.

8. To fix in place certain dislocated joints (acquired or congenital).
 9. To close bone foramina in neuralgias.
 10. To correct congenital or acquired deformities of extremities or trunk.
- More specific indications for bone grafting are:

1. To immobilize, support, and stimulate repair in spinal vertebræ, whose bodies are infected with tuberculous or other chronic infections where mechanical treatment is indicated. It is also applicable in cases of persistent non-union following fracture of the spine, presenting pain, disability, and increasing deformity, and should be inserted as for Pott's disease. Further indications are for certain fresh fractures of the spine; spondylitis traumatica (Kummell's disease) and neuropathic spine (Charcot) where, on account of a rarefying osteitis, crushing of the vertebral bodies and increasing deformity is likely to produce cord compression.

2. In the support and immobilization of cases of tuberculosis of the sacro-iliac joint, in certain desperate cases of tuberculosis of the tarsus, and in the form of inlays to hasten or insure bony union in erasure or excision operations for adult tuberculosis of the knee or hip.

3. In certain cases of paralytic scoliosis to support the weakened spine and prevent lateral deviation, due to superincumbent weight and unbalanced muscle pull.

4. To immobilize and support or replace bones of the tarsus destroyed, or partly destroyed, by tuberculosis.

5. To correct deformity or restore balance in congenital clubfoot and acquired deformity from local disease or paralysis.

6. As a substitute for all metal plates, screws, nails, spikes, and wires, as used in the internal fixation of fractures and other conditions. The graft, in the form of inlays and various sizes of nails or pegs, is employed by the author in all types of fractures, such as fresh and ununited fracture of the long bones of the neck and of the femur.

7. To produce a permanent closure of nerve foramina after nerve resection for neuralgia (Kanavel).

8. As a prevention of luxating or slipping patellæ by raising the low femoral condyle by inserting a graft in the form of a wedge.

9. To aid, in the form of numerous small grafts, rapid bone union where joint resection has been done or where a large graft has been used.

10. To strengthen and prevent lordosis or other deformity of the spine in cases of spina bifida where a large amount of bone is congenitally absent.

11. To replace the head and neck of the femur when previously destroyed by disease, the head and neck of the astragalus being used as a graft (Roberts).

12. In congenital and paralytic dislocations of the hip where the acetabulum is shallow and the femoral head will not remain in place. The upper half of the meager rim of the acetabulum is separated with a chisel and forced out and down, forming a pronounced rim. The cuneiform cavity thus produced is filled with wedge grafts.

13. To produce an ankylosis of the ankle joint in severe paralytic cases, or

tuberculosis in the adult, by placing a bone-graft peg through the os calcis and astragalus into the lower end of the tibia (Lexer).

14. To replace bone removed for osteomyelitis, tuberculosis, and spina ventosa.

15. For deformities of the nose by contacting graft with nasal bones. If the skin incision is made in the tip of the nose, the scar is not noticeable.

16. To replace or repair defects of the lower jaw; to fill in sunken places in the face, in the forehead following operation, in bony defects due to tuberculous osteitis of the facial bones, in recession of the superior maxilla due to hare-lip; to replace a mastoid process removed by operation.

17. In intraarticular fracture dislocations the head of the humerus or femur, etc., should be replaced, at an open operation, as a graft.

18. To repair cavities in the cranial bones by transferring from the immediate neighborhood one or two segments of the external table covered with periosteum. The cortex of the tibia or a portion of the scapula may likewise be used; the latter source is preferable, as both surfaces of the graft are covered with periosteum.

McWilliams, in his resume, furnishes the most succinct instructions as regards the technic:

1. Most scrupulous asepsis is an absolute essential to perfect success. It is most important that no infection be introduced into a clean field at the time the graft is transplanted. To this end the operator, assistants, and nurses should all wear rubber gloves, and the same scrupulous Lane technic should be employed as in fracture operations. Nothing that has been touched by the hand should go into the wound or touch the graft, and all instruments and gauze wipes should be handled by instruments. It is advisable not to tie vessels, but to allow the artery forceps to remain hanging in situ during the operation, after which they can be removed with little danger of bleeding. All sutures should be tied by means of clamps to avoid touching the sutures with the hands. Instruments once used should be laid aside and reboiled before using again. Sterile towels should be clamped all about the edges of the wounds so as to exclude the skin from the operative field. All this applies both to the site of the graft as well as to the field from which the graft is removed. A new knife should be used after the skin is incised and the old one should be laid aside. Tincture of iodine should be applied to the cut skin edges immediately after incision.

2. In general it may be said that all sinuses should be perfectly healed for at least three or four weeks before grafting is attempted, so as to prevent infection of the graft. While infection does not necessarily mean the death of the whole graft, yet the danger that it may entirely die is great. Lewis has demonstrated in two cases that a transplant may be inserted into an infected area with the object of affording merely a mechanical support to prevent deformity, even if it is necessary to remove it later. In some instances such grafts may remain viable and hasten convalescence.

3. The graft should be taken living from the same individual who is to receive the graft—i. e., an autoplasmic graft—if the best and surest means for success are followed. If this be not possible, which is very rare, then it should be taken from as near a blood relative as possible. Animal bone should never be used, because such a graft will be absorbed owing to the changed serological and chemical relations. If taken from another individual, syphilis should be ruled out by the Wassermann reaction and tuberculosis excluded.

4. A living graft should be transplanted *always* with as much periosteum covering it as possible. *Without* the periosteum the life of a graft has proved to be uncertain. Its retention will assure success if asepsis be attained. The question of just what the function of the periosteum is is an academic one. Practically the periosteum seems necessary for success in the greatest number

of cases. Less important for success, but still advantageous, is to have endosteum also on the graft, for the whole of a thing is greater than any of its parts. The value of marrow seems to be small; according to some authorities it is disadvantageous.

5. The success of a graft seems to depend on a speedy adherence of the periosteum to the surrounding parts, that the blood supply may be as quickly established as possible. Effused blood will prevent this adhesion; hence bleeding and oozing should be checked to the greatest extent possible. In addition, a blood clot about a transplant does not permit of the permeation of serum into the bone and also prevents vascularization. Lewis gives several instances in which hematomata caused absorption of the grafts. On account of the oozing subsequent to the loosening of a tourniquet, this had best not be employed.

6. No drain should be used, since this predisposes to infection.

7. A motor saw is of inestimable value in bone-grafting operations.

8. In taking a graft from the tibia, its crest should not be employed, for this is the strongest part of the bone, and its removal will predispose to subsequent fracture. Before this was appreciated, McWilliams had two fractures of the tibia from whose crests grafts were taken, while other fractures have been reported. If the crest is used, the limb should be strengthened by a plaster splint for several months after the transplantation, as new bone in such a defect is but slowly reformed.

9. All foreign nonabsorbable material, wires, nails, celluloid, horn, rubber, etc., should be avoided as implants, except under very exceptional conditions. Encircling wires will erode the bone and a fracture may result. These non-absorbable bodies tend to irritate, if not invite, suppuration, and often produce sinuses which will usually require their removal. Chromic gut or kangaroo tendon should be used to fix the grafts in position.

10. When the head of the humerus, or radius, or femur is fractured and dislocated, and the joint is opened, then the head should be replaced and attached to the freshened lower fractured surface, even though the head be dead, provided it is still aseptic (Murphy).

11. A graft increases in size according to the demands put on it by the organism. Experience has taught that it is necessary to laterally fill up a defect completely with a graft. It is essential only to fill up a defect vertically, leaving nature to do the remainder.

12. After transplantation, absolute immobilization is essential for success. This should be maintained for at least three or four months; longer if roentgenograms show its necessity.

13. The periosteum of the bone into which the graft is inserted is an important element, and should be preserved and brought into contact with the periosteum of the graft, or over the ends of the same if possible.

14. The inlay graft in the treatment of fractures is to be preferred theoretically to the intramedullary splint, since endosteum comes in contact with endosteum, while the periosteum of the graft can be sutured to the periosteum of the bone. A much more successful method of treating nonunion in fractures than a Lane plate is the bone-graft. The intramedullary splinting has, however, given good results in the hands of many surgeons, particularly Murphy.

15. Transplantation of long bones with their joint surfaces has been successfully performed, as has been the case with half joints and with whole joints in a few instances.

16. A suggestion by Huntington seems valuable. He has found that the periosteum of a graft may be preserved *in situ* during operation by wrapping the fragment closely with zero catgut. Before closing the wound the strands of gut are divided and removed or cut short.

17. In operating on clean, comminuted fractures, the fragments should be replaced in their original positions if possible. If this be not possible, the pieces should be fragmented, retaining all the periosteum possible on the fragments, and replaced about the fracture spot.

18. The site from which a free graft may be obtained seems to depend on the individual preference of the surgeon. The majority seem to have used the tibia, while the fibula has been preferred by others. In a few instances grafts have been taken from ribs, clavicle, scapula, and the crest of the ileum.

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RECENT ARTICLES ON WAR SURGERY.

By NATHANIEL ALLISON, M. D.,

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It is with considerable interest that the author of this review notices two recent communications from France regarding the treatment of bone fragments in comminuted infected fractures, these fractures having been sustained in the course of military operations. One of these authors, Eynard, reports 124 cases, and writes a defense of the technic of the total removal of the comminuted fragments, saying that this method of treatment is quite general among the French. He gives as his reasons that it is better to remove a little periosteum than to leave a single denuded fragment in a wound, and that for one piece of loose bone that will live there are many that will die and form sequestra. His operations were done within fifteen hours after the wounds were received, and his cases were evacuated from his hospital wearing plaster casts to immobilize the fractured area. He has had out of 25 forearm fractures 24 that had no complications. He followed them for a period of four days. In 34 cases of shaft fracture of the humerus one died and there were four amputations, and two were followed for a period of four weeks. In 50 cases of leg fractures there were six amputations, nine cases were followed ten days, and three up to the time of union—four weeks. In fractures of the femur there was one death and one amputation in 15 cases. In the whole series of 124 cases there were two deaths and eleven amputations.

The interesting part about this paper is that the writer does not give or attempt to give any estimation of the ultimate results obtained. Of course the paper is of little value, except in the sense of pointing out what not to do in these cases.

The other paper is written by Cotte. This writer states that subperiosteal removal of bone fragments is the only method of preventing or curing infected open fractures and saving the limb. He notes that before the war this practice was condemned by most surgeons, but since its value has been abundantly demonstrated. He allows that this procedure might result in pseudarthrosis, but believes it prevents this by putting the periosteum in healthy condition, and also it opens the medullary canal and guards against chronic infection of the shaft of the bone.

He reports 41 humerus fractures, 28 forearm fractures, and 46 leg fractures, making a total of 115 cases in the series. In these there were twelve amputations. In 81 of these primary removal of bone fragments were resorted to. In the same way as Eynard, he gives the ultimate results in only 4 cases out of 115, making his series of observations practically valueless.

In discussing these two papers it may be said that perhaps the most valuable surgical observation that has been made on the injuries sustained in the present war has been the observation that these compound comminuted fractures had best be treated with a high degree of conservatism. Bone fragments that seem detached and valueless have been shown by numerous observations to be perfectly viable, and have aided in the establishment of union and the reforming of normal anatomical contour in the shaft of the shattered bone. So much so is this the case that it is deemed very bad surgery by most men who have had experience in base hospitals to remove bone fragments at all. The essential

requirement is to establish free drainage and the clearing up of infection by proper methods of irrigation and continued drainage.

It is the opinion of the writer of this review that articles such as these are misleading, and cannot be too promptly condemned, as they encourage the tendency to do radical surgery on a class of cases that should be entirely protected from this pernicious activity.

Bosquette recommends that the treatment at first-aid stations should consist of the injection of salt solution and camphor oil to improve the patient's general condition, that bleeding should be stopped, and that the wound should be superficially cleansed by the application of iodine and hypochlorite solution, and that the fractured extremity should be splinted, preferably in a wood splint, strapped to the side of the stretcher. When the patient has reached the hospital he should be rested in a warm bed for at least half a day before any operation is done, other than an urgent one. He recommends for operation the removal of shell fragments and other foreign material, and also advises the removal of all bone fragments not adherent to periosteum, and the establishment of drainage. He insists on the reduction of fragments and on rigid immobilization of them, and for this purpose advises a plaster cast.

His paper is written on fractures of the thigh, and he states that unfortunately, due to the necessities of war surgery, most of his cases were not followed to their conclusions. He states that casts are not well adapted to this type of fracture in the thigh, and retrieves himself partially from the error made by the other two authors in the following statement. He says, "It is doubtful whether the removal of all loose bone is advisable in every case, for in some of these badly comminuted cases it results in a gap of several inches between the fragments, which renders bony union impossible without subsequent grafting."

These three papers perhaps present a fairly well-established viewpoint which has gained a certain following by surgeons operating in hospitals back of the first-aid stations. It has been the experience in such hospitals as the American Ambulance at Neuilly that cases coming from a certain district behind the lines were all treated in this way, whereas those coming from other sections had been simply splinted and partially drained with hemorrhage more or less perfectly controlled. The contrast between these two groups of individuals at the end of three months leaves no question of doubt as to the inadvisability of radical measures in comminuted compound fractures. Many bones that were extremely shattered after the infection was controlled healed with good union, very good alignment, and practically no deformity. It seems advisable to very forcibly emphasize this observation.

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THE ROENTGENOLOGY OF THE VERMIFORM APPENDIX.

By E. H. SKINNER, M. D., of the Editorial Staff.

The roentgen appreciation of the vermiform appendix seems to have developed entirely within American confines. We note, for instance, that Schwarz' monograph on the colon calls on an American roentgenologist (Case) for appendicular illustrations. There appears to be a reason for this in the use of fermented milk suspensions for the opaque materials. The use of the carbohydrate Rieder meal (farina, cream of wheat, etc.) seems to give more definite findings regarding gastrointestinal motility, but the thinner meals of buttermilk, fermented milks, acacia suspensions, cocoa compounds, etc., seem to give better findings on the filling defects, such as duodenal defects and diverticula, appendices, colonic diverticulosis, etc. At an earlier period some claimed that these defects were not seen fluoroscopically, but it now seems to be generally recognized that the fluoroscope can present these shadows which the radiograph so accurately records permanently. In fact, the fluoroscope, preferably the horizontal roentgen table or trochoscope (Williams type), offers a most satisfactory technic for the fluoroscopic visualization and palpation of the appendix in its various pathological wanderings or anchorage.

The technic of the roentgenoscopic appreciation of the filled appendix depends primarily on the willingness of the pathological appendix to accept the opaque media. The question as to whether the normal and abnormal appendix both accept opaque food residues has not had sufficient discussion or experimental determination. Dogmatic statements can hardly be accepted, although reported at this time. The reviewer has an opinion, based on experience and an hypothesis with some foundation, both of which will be reserved as being outside of a truly collective abstract. The frequency with which an appendix filling is found in the course of roentgen studies of the gastrointestinal tract depends on the thoroughness of the examination. When definite pathology is found in the stomach, duodenum, or gall bladder, the appendix may be overlooked or considered a negligible quantity; or the examination may be terminated before the appendix has had an opportunity to fill. This latter feature has not had much discussion, but the reviewer would suggest that it takes at least forty-eight hours to ten days to properly study a chronic appendix. Therefore the mere statement that an observer has encountered an appendix filling in a given percentage of examinations requires further analysis regarding the duration and completeness of such examinations.

We find that Case reports a demonstrable appendix in 273 out of 763 cases which were referred because of gastrointestinal symptoms. Case cannot believe that the ratio of patent appendices is much greater than one in three of patients with symptoms. Eisen reports 36 cases, in 30 of which a definite roentgen report of appendicular involvement was confirmed at operation, and in 4 cases negative roentgen reports were refuted by the operation, which revealed appendicitis. George and Gerber have succeeded in demonstrating the appendix, either normal or pathological, in 7 out of every 10 cases.

In the 141 cases Quimby was able to obtain sufficient data to determine the condition and position of the appendix in 90 percent of them; the remaining 10 percent were those in which the position of the cecum prohibited a thorough inspection.

Regarding the significance of bismuth fillings of the appendix, there is no agreement. At one extreme we find Groedel stating that the ability to demonstrate the opaque filled appendix is a sufficient basis for accusing it of being pathological. Case is inclined to the view that the appendix which can be filled with bismuth, if not definitely pathological, it is at least potentially dangerous. George and Gerber agree with Case in those cases where bismuth remains in the appendix forty-eight hours or more after it has passed out of the contiguous intestinal tract. They do not believe that the potentiality for danger is any greater in cases in which size, shape, and position of the opaque appendix corresponds to the normal organ. Imboden states that the mere presence of some of the opaque media still in the appendix is no indication of chronic disease. Cohn says that fecal contents enter normally into the appendix.

As Case aphoristically remarks, however, the essential point to determine is, "not whether the appendix fills, but whether it empties," and, again, "a poorly drained appendix is a dangerous appendix." Imboden neatly defines this question when he states, "delay in emptying of the appendix indicates interference with drainage and must always be regarded with suspicion, especially so if delay extends (1) over a period of twenty-four hours after the cecum is normally empty, (2) if it is still filled or contains any opaque material after vigorous catharsis, and (3) especially so if the visualized appendix in which there is delay in the emptying time is associated with a distinct area of tenderness."

The most recent published note on opaque appendiceal fillings occurs in *Fowler's Review* in July, 1916. Here we find Case reported as saying that barium in the appendix is an abnormal phenomena, and, further, the poorer the drainage the greater the danger. Rather paradoxically Case says that "opaque filling by no means indicates surgery." In this same article Pfahler is reported as follows: Barium retained in the appendix after the bowel is entirely empty probably indicates a relaxed or inflamed appendix."

The roentgen signs of appendicitis, according to Case, may be classified as follows:

(A) In acute appendicitis no signs are needed except the barium enema as a possible means of identifying the tenderness on pressure as being over the appendix.

(B) The roentgen signs of chronic appendicitis are (1) poor drainage, (2) localized tenderness on active palpation done under fluorescent guidance, (3) kinking, (4) irregularities in the lumen so that the appendix is bulbous at the tip, and especially poorly drained at the tip, (5) associated adhesions to the cecum and the terminal ileum, (6) unduly long or unduly large appendix. All these signs need not be present. The diagnosis should not be based on roentgen findings alone.

Pfahler reports the roentgen signs of appendicitis as localized tenderness over the appendix, fixation, angulation, constriction, local dilatation, adhesions about the cecum, incompetent ileocecal valve, and undue retention." (December, 1915.)

Imboden concludes that (1) retention of appendiceal contents after the cecum is empty should be regarded as suggestive of chronic appendicitis, (2) a tender area located in the course of the appendix should always be regarded as suspicious.

There has been an attempt to classify opaque appendiceal findings. For instance, Quimby notes (1) functioning or nonfunctioning appendix, (2) fixed or movable appendices, (3) ascending, descending, transverse appendices, (4) great kinked, curved loop appendices. Imboden defines certain anatomical positions of the appendix, but he very properly remarked that the position is

dependent on a large number of conditions, in either one of which it is possible to have a chronic appendix, but chronic appendiceal disease is not dependent on position.

In a thoroughly fair review of the literature on the roentgenology of the appendix, the main point in differential diagnosis quite evidently and righteously seems to be the question of drainage, and, in closing, we can conserve the usual abstractor's paraphrasing ability by quoting Case as follows:

"If the appendix fills and empties itself, it is not likely that the filling has any pathological significance. On the other hand, a poorly drained appendix possesses a potency for danger in proportion to the length of time it requires for emptying. Neither the acutely inflamed appendix nor the obliterated appendix can be shown following the barium meal. The conclusion is not, however, warranted that the appendix is obliterated because it does not show in the roentgenogram. The appendix may lie retrocecal in such a manner as to escape discovery, even under the most careful fluoroscopic manipulation."

There could be a much more formidable array of citations for this article. The articles of Case and Fowler append 38 and 90 references, respectively. One may rightfully consider the reprinting of such a long reference list as unnecessary, and the articles cited herewith have been chosen as offering the most recent and reliable information.

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HEMATEMESIS AND ITS RELATION TO CHRONIC APPENDICITIS.

By JEROME E. COOK, M. D., of the Editorial Staff.

There has been a tendency in the past few years to base the diagnosis of gastric ulcer on a clear-cut and typical history, without great regard for the negative results of physical and other examinations. This has been particularly the case when, along with the patient's other gastric symptoms, there was the history of the vomiting of blood. Yet, as early as 1901 there had appeared case reports by various authors in which hematemesis had occurred in cases where no ulcer could be demonstrated and in which there was no other condition, such as hepatic cirrhosis with dilated veins at the cardia, to explain the hemorrhage. In 1910 Moynihan called attention to the role which distant organs might play in the causation of gastric symptoms, including hematemesis and laid particular stress on the necessity of regarding the appendix with suspicion, stating that disease of this organ could closely mimic or exactly reproduce the picture of gastric ulcer. "Nausea is not infrequent and hematemesis may occur. In perhaps a dozen cases of my own the hemorrhage from the stomach has been considerable—that is to say, a quantity in excess of a pint has been vomited at once." He cites as a typical example a patient who for five years previous to operation had had a number of severe hematemeses. Several ulcer "cures" had given no permanent benefit. At operation no lesion was found in stomach, duodenum, or gall bladder. The appendix, which was sharply kinked and adherent in its proximal part, was removed. Complete relief of all symptoms followed the operation. After the appearance of Moynihan's article similar experiences were recorded by other surgeons, and the term "medical ulcer," which was gaining much respectability as a diagnosis in those cases where no lesion could be demonstrated at operation, came to be viewed with much misgiving. It is only recently, however, that an attempt has been made to explain the mechanism by which a lesion in the appendix could cause gastric hemorrhage without the presence of ulcer. How well the explanation will stand the test of clinical observation remains to be seen, but the case reported by Outland and Clendening and the deductions which they draw are most suggestive. Their patient was a farmer, 50 years old, who had never suffered from any acute abdominal attack. Five years before he had consulted a gastrologist for constipation, sour stomach, and acid eructations, with epigastric pains before and after meals. He had vomited blood several times after prolonged hiccoughing spells to which he was subject. With treatment he remained well for a year, after which the symptoms returned. Further treatment gave only temporary relief. When he presented himself for operation, there were symptoms of epigastric pain and recurrent vomiting. Two weeks before he had vomited twice, bringing up a pint of dark-red blood each time. There was right rectus rigidity and epigastric tenderness. The stomach contained superacid contents, with occult blood. At operation the gall bladder was free, the stomach showed no sign of ulcer—no scar, dimpling, etc. "The surface of the gastric serosa around the pylorus was reddened, and mottled with small veins like a drunkard's cheek. The veins in the region were distended and tortuous, and in the mesentery, along the greater curvature, were numerous small, hard, shotlike glands." The appendix

was buried in a mass of adhesions and could be separated with difficulty. Its mesentery contained several pea-sized glands. The ascending colon was inclosed in a veil of rather dense membranes. A year after the operation the patient was symptom free—no vomiting since the operation. The authors believe that the dyspepsia, superacidity, and epigastric pain were the reaction of the stomach to the continuous stream of infection passing from the appendix up the omentum, which was adhered directly to the appendix, to the organ which forms the attachment for the omentum—the stomach. They are of the opinion that the hemorrhages were due to “seepage” from the inflamed gastric mucosa, rather than any rupture of an enlarged vessel. It is difficult to see just how they are able to draw this distinction, nor does it appear that the distinction is important. The all-important point is that a seemingly direct anatomical connection existed between the chronically inflamed appendix and the hyperemic vessels about the pylorus, and that removal of the appendix put an end to the hematemeses and other gastric symptoms. Whether an identical or similar connection exists in other cases of gastric hemorrhage without ulcer, now that attention has been directed to it, remains to be seen. It is probable that the appendix is not always the primary focus of the trouble. This would seem to be the only conclusion warranted by the four cases reported by Moschcowitz. In one of these, with severe, repeated hemorrhages and no stomach lesion, appendectomy gave no relief. In a second case it was followed by complete recovery. In just what percentage of these cases of hematemeses without ulcer the appendix is at fault is a matter for future determination. One thing seems certain—when on operation in a case of gastric hemorrhage no ulcer is found, careful search must be made for the site of some primary focus of infection in the abdomen.

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ORIGINAL ARTICLES.

SOME CONSIDERATIONS ON BRAIN SURGERY.¹

BY JOSEPH RANSOHOFF, M. D., F. R. C. S. (Eng.), Cincinnati.

In accordance with the time-honored and therefore proper custom on occasions like this, I desire to express my honest pleasure at being asked to appear before so distinguished a body. I shall refrain, however, from the equally time-honored and therefore proper custom of complimenting my hearers and extolling the achievements of their city. Only two years ago you heard sounded peans of praise from everywhere in this broad land and abroad on your rejuvenation as a medical center. The generosity of some of your citizens has set an example that is being followed in other communities. If I voiced my sentiments now on the same theme of your great progress, it would at best be but a feeble refrain.

I cherish a real fondness for your city. More than twenty-five years ago I here presented one of my humble efforts. It was the case report of an aortic aneurysm, treated by the insertion of fifty feet more or less of silver wire. The aneurysm was hardened and was cured in one place, but unfortunately, as always happens, it broke in a spot not reached by the wire. The specimen presented at the time caused considerable comment. Some weeks later I met your cosmopolitan fellow-citizen, the late Dr. Pollak, on the top of Pike's Peak. He seemingly was glad of the opportunity to meet me—indeed, seemed to have waited for it. He was very frank. He simply said, "I heard your paper on aneurysm. It was very interesting, but, if it had not been for your youthful appearance, I would have moved that the essayist be immediately hanged by the wire he introduced."

When one considers the technical strides that have been made in every branch of the surgical art, and the fact that they are being more and more guided by a science that is fast becoming exact, one must be a pessimist by birth or by reason of age to set a limit to the progress of brain surgery. Nor is this the object of my address. It is rather to take stock of what we already have. After all, brain surgery is less than 50 years old. It began with the experiments on localization, and it is only 43 years ago that the late Dr. Barthelow, of Cincinnati, first demonstrated the localizing

¹Read, by invitation, before the St. Louis Surgical Society and the St. Louis Surgical Club March 14, 1917.

functions of certain centers in a woman in whom an epithelial cancer had destroyed the vault of the cranium.

The first step of all brain surgery—trephining—is older than written history. Why and how it was done is a matter of polemics. After all the intervening ages the why and how should be definitely settled. Still no major operation is undertaken with less degree of certainty as to its findings than trephining.

The thrill of triumph which the older surgeon felt when a stone in the kidney was touched by his finger, guided thither by reasoning, on symptoms alone, can never be felt again. The x-ray has done for that. The operation is like whisking gold fish from an aquarium with a dip net. In the surgery of the brain and cord alone the possibility for a real thrill remains. It comes every time one exposes a growth of the brain or cord, or when with the electrodes one starts a spasm of certain groups of muscles, to end in a convulsion like that for which the operation was undertaken. But even here the field for thrills is being invaded. The x-ray, with remarkable distinctness, shows up fractures with or without depression, and linear fissures, of which with good stereoscopic plates one can trace their finest ramifications. Deformities of the base are likewise diagrammatically outlined. Then, the x-ray leaves us in the dark. The most experienced among us, therefore, approaches a trephine operation with a degree of anxiety. Not that the operation is dangerous, for hemorrhage can now be controlled by a proper tourniquet, or, what I prefer to use, the prophylactic locking backstitch. But even with this, bleeding may prove fatal. In a case reported by me before the American Surgical Association I used the electric saw. The patient died from venous bleeding in a few minutes, before the tumor could be exposed. The autopsy showed two diploic veins cut through. They were as large as slate pencils. There was a cortical neoplasm directly under the opening. It was as large as an olive, and could have been lifted from its bed with an iris forceps.

Conceding that trephining *per se* is practically without immediate risk, there must still be considered, particularly in decompression operations with dural opening, the possibility of the later development of paralysis, spurious meningocele, of epilepsy and of abscess. The following is an illustrative case. A boy, 10 years of age, was thrown from his bicycle and sustained a depressed fracture of the right half of the frontal bone. He was trephined at the Jewish Hospital. The dura was not opened, brain pulsation being normal. The recovery was uneventful, the boy leaving the hospital on the tenth day without a suspicion of infection. During the following three years he attended school, ranking among the first in all his classes. One night, after returning from skating, he complained intensely of headache. Dr. E. W. Mitchell, who witnessed

the operation, was summoned the next morning, found the boy in deep coma, and death ensued within twenty-four hours, before an operation could be arranged for. The autopsy revealed an abscess in the right frontal lobe, directly under the area trephined. The button of bone and fragments which had been replaced at the operation were firmly and evenly united. What was the sequence of changes can only be surmised. Probably an abscess in the silent area had lain dormant all the time and ruptured in consequence of excessive vascularization following unusual muscular activity. It is fairly assumable that without operation this abscess would not have developed.

To the general surgeon, fractures with their concomitant brain injuries will always constitute the majority of cases in which operation may be indicated. Here stereoscopic x-ray pictures give an assured estimate of the damage to the skull. Lumbar puncture gives an approximate idea of the damage to the brain.

In our equipped hospitals both examinations should be routine in every case. This applies particularly to basal lesions in which the delay of a few hours may determine the end. It is in these cases above all that the decompression operations, although not at all new, have been so forcefully advocated, especially by Cushing, that one almost feels derelict if he withholds the knife in any case. The fifteen cases saved out of seventeen operated on by him for basal fracture look tremendously alluring to the neophyte. With the *furor operandi* unallayed by experience, it tempts him perhaps to ruthless operation. I have in mind a man of 68, falling a short distance, landing on his feet, and in striking his head sustained a wound of the scalp. He was severely stunned, but not for long. There was no bleeding to indicate a basal lesion. A neophyte of ultra modern tendencies rushed the man to the hospital in *persona propria*, and informed the supervising nurse of the operating room that he made it a rule always to trephine these cases. But this proved an exception to the rule, because wiser counsel prevailed and the man escaped with a whole skull and a dislocation in Chopart's joint. The occasional operator with inefficient assistants and in inauspicious surroundings should not be wooed from the right course by the brilliant results achieved by the select few.

Many basal fractures are stamped for death from the moment of the accident. In the study of nearly 200 cases occurring in sequence in the Cincinnati General Hospital, 37 per cent of the deaths occurred within the first six hours or less, and 56 percent within the first twelve hours. In these cases the limit to save life by any operation has been reached. I do not recall more than one or two instances in which I believed that an operation foiled death in cases that seemed hopeless before operation. In only 6 percent of our cases did death ensue on the second day, the cases in which coma

was not profound to complete muscular relaxation. In this class of cases where facilities for a major operation are not at hand, repeated lumbar punctures are of great service. Indeed, this procedure I believe is destined to take the place of decompressive operations outside of hospitals. It relieves brain edema when the bleeding has come to an end, as it does in the edema due to delirium tremens or uremia.

There is a large group of cases in which there is complete consciousness, or a somnolence, or milder degree of coma, and in which the concomitant symptoms do not indicate a grave intracranial trauma either to the brain or its vessels. The pupils, though uneven, react; involvement of one or more cranial nerves may be evident. The symptoms, singly and collectively, are not ominous at any time. Eighty percent of this class have a tendency to get well with or without operation. They should not be operated on unless the symptoms indicate an increase of intracranial pressure from hemorrhage or beginning cerebral edema, or distinct localizing (cortical) symptoms.

There is a distinct class of cases in which operation is indicated. They are cases which, seemingly not severe in the beginning, grow progressively or suddenly worse, showing signs of increased intracranial pressure. Decompressive operation will save a considerable proportion of them.

The x-ray helps us to determine where trephining should be done to obtain the best results. In fractures—for example, of the posterior fossa—any other than a subtentorial decompression would probably be of little service.

The rule that all localizable brain injuries with fracture are to be operated on stands. Even here surprises will from time to time occur. Not long ago there was admitted to my service in the General Hospital a man of 68 years. While he was at work in a stone yard a lady friend stealthily slipped up behind him and gave him a gentle greeting with an axe. Arrived at the hospital, there was a scalp wound without visible fracture. He was in deep coma, with breathing stertorous and approaching the Cheyne-Stokes type. There was a complete left-sided hemiplegia. The operation by one of my assistants failed to reveal a supradural clot or any injury of the cortex.

When the man regained consciousness two days later, we were startled to learn that the arm had been paretic for many years. We might have known it, for his right side alone was horny-handed. The probabilities are that the blow caused the tear of some weak vessel near the site of a previous apoplexy.

The surprisingly large proportion of head injuries due to trench warfare has given us valuable information applicable to the injuries of civil life.

The experience on both sides of the western line has been that the brain substance itself is not easily, and therefore not rapidly, infected. Wherefore it has become the consensus particularly of German surgeons that none but the simplest operations should be done, except at the base hospital. Cushing, from a wide experience in France, has come to the same conclusion. The usual removal of splinters and of missiles, as practiced in the hurried moments that can be given to the individual case near the firing line, is being deprecated, and therefore, wherever possible, cases that will bear transportation are referred to a hospital in the rear, where the proper procedures can be instituted in orderly fashion. The notion prevailing during the early months of the war that these cases bore transportation badly was based on the observation that many of them developed infection after transportation. This has been shown to be coincidental, and that the infection resulted from the operative procedures instituted under adverse conditions. A further important fact elicited is that, if a trephining is to be done, the incision should be made away from the wound, and the latter, if not too large, excised. A further lesson that is being inculcated is that drainage, unless infection be already present, should be altogether avoided, and that, even where the brain substance has been extensively lacerated, drainage, and gauze in particular, should not be used. Here, as elsewhere, after a few hours the gauze packing ceases to do that for which it was intended. A strand of silkworm gut or a strip of rubber tissue in the angle of the wound is all that is needed if drainage must be provided for. Primary union without drainage is being sought for in military practice, as it has long been in civil practice, and, as we have learned by long experience that the closed peritoneum can dispose of a moderate primary infection without drainage, we may now learn that the membranes of the brain may, though in less degree, be competent in the same way.

Along with the striving for primary union, the covering of the dural defects by fascial or other implants, by tending to prevent hernia, enhances the chances for primary and definitive wound closure. On November 1, 1915, a man 30 years of age received a charge of bird shot in the right side of his skull. It was fired at about 15 feet. He was immediately felled. When seen at the hospital, which was about 15 miles removed from the place of the accident, he was deeply comatose, with complete flaccid contralateral hemiplegia. The wound was tangential in character, and involved the right parietal bone, from which an irregular button about two inches in diameter, together with the overlying scalp, had been blown away. Brain substance oozed from the wound, and quite a number of bird shot and small bone fragments were picked from the exposed part of the brain and scalp. After cleansing the wound and removing the brain detritus by gentle irrigation, egg membrane was

placed over the dural defect. To close the large wound, an adequate scalp flap with pericranium was twisted into the defect and the wound completely closed, save for a silk-worm gut at the lower angle. This man made an uneventful recovery. Within six months the hemiplegia had entirely disappeared. This recovery of brain function is consonant with many recoveries that are being reported from the base hospitals abroad.

I approach the subject of trephining for abscess and sinus thrombosis with the diffidence of the general surgeon who has been properly forced to yield part of his domain to the specialist striving for a place in the sun. If we except the fairly common traumatic abscess and the rarer ones following some remote infection, chiefly of the lungs and liver, practically all that remain are sinusitic or otitic in origin. The road of invasion is through the antral or tympanic roof, and it is along these ways that the abscess can be most easily and safely reached. The otologist knows or should know the region where millimeters count. He can worm his way better than I to a superficial abscess, and his patient gets well. If he hits on a sinus thrombosis, if he does the right thing, he gets a general surgeon to expose the internal jugular vein. If fortunate enough to strike a deep abscess in the temporosphenoidal lobe or cerebellum, his result will probably be no better than if you or I had officiated.

About twenty years ago the princely D. Hayes Agnew traced sixteen cases of cerebral abscess drained in Philadelphia. They had all gone to their last homes.

The results today are surely very much better, and an ideal report is that of Barany, from the Hospital at Przemyśl, who had 12 recoveries in 13 traumatic abscesses. They were all drained with rubber tissue. The final condition, even if recovery ensues, is often desperate. A year ago I assisted in trephining a lad with left frontal abscess, following frontal sinus infection. His condition at the time of admission did not permit of visual tests. He recovered from the operation completely, but there was then discovered total blindness of the left eye and hemianopsia of the right. To add to his deplorable condition, he has had a number of epileptic seizures, and is a confirmed victim of jocular obsession.

The most interesting chronic abscess which has come under my observation was that of a man who was shot with a 32-calibre rifle in 1899. He did not lose consciousness, but there was an immediate left-sided paresis, which, however, did not prevent the patient driving home unaided. His recovery was complete. Four and a half years later he had his first general convulsion, and four further attacks during the two years following. X-ray examinations then showed that the bullet was broken into three fragments, one of which was evidently extracranial. A second fragment was just within the middle fossa, and the largest fragment was behind

the frontal sinus on a level with the cribiform plate. Since the most careful neurologic examination failed to reveal any Jacksonian type and an entire absence of localizing symptoms, we were unable to determine which of the fragments caused the epilepsy. Considering the infrequency of the attacks and the excellent condition of the patient, an operation was not deemed advisable. Nearly ten years after the injury the man was on his way to the city to consult me for a return of the left-sided hemiparesis. The train gave a sudden lurch, after which the man complained of a splitting headache, and he died at his hotel ten hours after the onset of the headache. The autopsy revealed an enormous walled-off abscess of the sphenotemporal lobe. In the tough abscess wall was a small piece of bullet, seemingly encysted, and another connected with the abscess. The largest piece of the bullet was imbedded in the cavernous sinus, and evidently had been innocuous from the time of its lodgment there. How long had this abscess been present? Was it latent? I reluctantly quote from Mr. Ballance: "Is it not possible that in at least some of the latent cerebral cases the latency has been in the faculties of the observer, and not in the clinical reactions of the patient."

Brain tumors display as nothing else in surgery can the diagnostic acumen of the physician and surgeon. A few months ago there was referred to my service from the neurologic service of Dr. Hoppe a man of about 50, with choked disk, blindness of the left half of each eye, and perseverant type of aphasia. There was no paralysis of any kind, no asternognosis, nor was there headache. The diagnosis read, "tumor under left angular gyrus, involving the posterior fibers of the inner capsule." The operation revealed an infiltrating, partly broken down inoperable glioma, centrally softened, and of the size indicated by the diagnosis.

In only 40 percent of the cases is the tumor found, because, except in those of the central convolutions of the acousticus and of the pituitary body, the failures outnumbered the successes. This is largely due to the important initial symptoms being overshadowed at an early date by the graver signs of increased tension. When these exist, the localizing symptoms, if slight, are often difficult of clean interpretation. A further difficulty is found in the fact that gliomata so often resemble the normal brain substance in color and consistency that, although they may be perfectly exposed, it may be questioned whether a tumor exists. As Virchow so well put it, "these gliomata often look like an overgrown convolution projecting a little over the general surface."

When the growth is subcortical, the difficulties, of course, are enormously increased. In only three instances have I been enabled to remove such a growth with some satisfaction. Two of them died

of recurrence within the year, and the third one, of an infiltrating sarcoma of the cerebellum, is living and well after a year and a half.

Even in cortical growths the end result is usually unsatisfactory. Two years ago I saw a man from whom I had removed a tumor nearly as large as an egg from the motor area in July, 1893. The man has not been an economic asset since the operation. After more than twenty years there is still a paralysis of the opposite side, and from time to time the man had epileptic seizures. In another case the removal of a solitary tubercle from the motor area was followed by a cure lasting over four years. A second operation was then done for a recurrence of symptoms, and a tumor again removed. The patient died a year later. In contrast with these results I would cite that of a man on whom 20 years ago a decompressive operation was made in the left temporal region for a non-localizable tumor. The relief was instantaneous. Two years later the left eye-ball was removed for sarcoma. In the fourth year after the first operation the general symptoms, particularly the intense headache, recurred and necessitated a second trephining. Recovery took place, and there was no return of the symptoms. Within the past year this patient died of cancer of the rectum.

The difficulty in making the diagnosis of cysts at the time of operation is often very great. Whether it is an actual cyst formation, a localized accumulation of cerebral spinal fluid, or what the Germans have called serous meningitis, may not always be agreed on by the pathologist, the neurologist, and the surgeon witnessing the operation. This is particularly true of the posterior fossa, where cysts are relatively often found. The fatality of these operations grows with the difficulty of finding the tumor. It is much greater when the search has been in vain than when a removable tumor has been found. As I believe Cushing first put it, "the brain is not a pie, even though it is often so treated by the little Jack Horners of surgery." I am glad to state that the brain punctures of Neisser and Pollak, so commonly practiced in German clinics, has found no following in either England or here. It is a hit-or-miss proposition, and may, as it has often done, cause such increase of intracranial tension from hemorrhage as to make immediate trephining compulsory.

How slight a hemorrhage in the right place may prove fatal was dramatically illustrated to me in the case of a German lad of 19, admitted to my service in the Cincinnati Hospital several years ago. He came for a large periosteal sarcoma of the humerus, for which I advised amputation. The boy was satisfied, but would not permit operation until he had obtained the consent of his parents. He said that the arm belonged to his old parents as much as to him. Unfortunately, they lived abroad. I told the boy of the great gravity of delay, but he did not yield, stating, however, that if I chose, we

might take out a piece of the growth to confirm the diagnosis. I am virtually quoting his own language.

When I came into the ward on the following morning, the boy was deeply comatose. After my visit of the day before he complained intensely of headache. The coma came on during the night. A provisional diagnosis of cerebral tumor with an acute hemorrhage was made. The boy died within forty-eight hours of the time I first saw him. The autopsy revealed a soft tumor of the under surface of the middle lobe of the cerebellum, from which a hemorrhage had extended into the fourth ventricle and was slowly leaking into the Sylvian aqueduct.

The surgeon who looks for brain tumors must not fear a mortality that seems, and perhaps is, appalling. Kittner, of Breslau, in the most recent available statistics from abroad, lost 45 out of 104 patients as a result of the operation. Krause, who disposes of the largest material in Germany, has lost 50 percent, and Von Eiselsberg, 38 percent. Tooth's tables from the London National Hospital (Horsley) show that 20 percent died within a few hours, and 32 percent within a few days after operation. Happily, a beam of sunshine lights up the gloom that comes from so staggering a mortality. It comes, of course, from Boston, where Cushing, in only eighteen months, performed 136 operations for brain tumors, 37 of which were hypophyseal, 48 operations for supratentorial lesions, with only four deaths. Curious as it may seem, operations on the cerebellum, which little over a decade ago were almost demoted from justifiable procedures, have been made quite as safe as operations for large pretentorial growths.

Two factors conduce to this. First, a large proportion of cerebellar tumors turn out to be cysts in which drainage alone is required. For the solid tumors, which can not be removed, decompression promptly relieves, at least, the most distressing symptoms and puts off the end. It must not be forgotten, however, that deaths on the table from sudden respiratory failure must always be looked for in subtentorial operations, where distortion or bruising of the medulla may not be avoided.

In a case of infiltrating sarcoma of the right cerebellar hemisphere, incompletely removed in December, 1915, 100 milligrams of radium were used on three occasions. This patient still continues well, although it is doubtful whether the *post hoc, ergo propter hoc* applies. This patient was operated on in two stages, as I operate most cases of brain tumor.

I have from the beginning believed in two stage operations, because good results frequently follow the first interference, which permits the brain, by relieving pressure, to readjustment. A striking case of this kind recently came under our care at the Jewish Hospital, where in a man of 60, profoundly comatose from a sub-

tentorial lesion, a suboccipital decompression, without opening the dura, was made. The improvement was immediate, and impending death staved off. A week later, under local anesthesia, a cerebellar cyst was drained. That the man died a little less than three months later does not invalidate the gain achieved by the two stage procedure.

In the earlier history of decompressive operations it was the routine operation to make an opening in the right temple. This is bad practice, since in cerebellar growths death may result from it, as it did in one of my cases by pressing of the brain stem into the tentorial isthmus. This is the reverse of what takes place when death follows lumbar puncture. A method devised by McGuire, who makes a large bone flap over the occiput, appeals to me, since through such an opening either the supra or infra tentorial space can be reached according to indications.

The pessimistic mood in which the results of brain operations must leave us becomes cerulean, deep as indigo, when we regard our failures in the treatment of epilepsy and hydrocephalus, and particularly epilepsy, for, fortunately, the hydrocephalic dies young.

About one in every thousand is an epileptic, not including the interned insane. When one considers how an entire family is affected by one epileptic member, the enormous proportion of the disease from a social aspect becomes apparent. Just now it is of paramount interest. It is a question whether it belongs to surgery at all, and, if so, to brain surgery in particular. It is impossible to accept as final Horsley's dictum that there is no surgery of generalized idiopathic epilepsy. Of course, the clean traumatic cases are excluded from discussion, although even here only about 10 percent are permanently cured, but I know from experience that it is worth while to cure an epilepsy even at the risk of leaving a partly palsied arm or leg.

In regard to idiopathic epilepsy, much has been written of late, and particularly in my home city, on the intestinal origin of epileptic seizures. As I stated on the floor of our academy, the architect erected a marvelously complete structure. From foundation to attic it was fully equipped, even to the heating system of hot air. The disease was a toxemia, due to a specific bacillus, with its habitat not somewhere in France, but somewhere in the intestine. The bacillus shown was as large as that of anthrax and resembled a miniature shillalah. Pure cultures from it injected into rabbits threw them into fits. A stupid rabbit licking the blood from the ear of one of its cage mates likewise developed fits. Therefore the portal of entry was the alimentary canal. In 100 percent of the cases of convulsions of intestinal origin, stasis due to obstruction from kinks or other deformities was found. The whole structure was based on an intestinal bacillus as an etiological factor. Dr.

Reed has recently acknowledged his mistake as to etiology. Therefore, as I stated upon the floor of our academy, the perfectly appointed house was built upon sand, and could not stand. "Es wär so schön gewesen es hat nicht sollen sein."

That epileptics are constipated is not a new discovery. They are constipated because epileptics, as a rule, are slovenly in most of their habits. A careful regulation of the alimentary canal has long been deemed essential in the care of epileptics, but it is a far cry from this to operation. In my judgment, since over 50 percent develop before the twentieth year, and there is a distinct neurotic inheritance in 40 percent, everything points to the cerebral cortex as the site of a change, the nature of which is beyond our ken. How else can one explain, for example, the total and permanent disappearance of an epilepsy of many years' standing after an apoplectic stroke. Such a fact, and there are many more, cannot be reconciled with the concept of an intestinal toxemia as the basis of the disease. A broken leg, a fractured skull, an attack of pneumonia, a severe burn, caused during a spasm, among many causes, may for many months, or even years, break the years-old cycle of convulsions, just as did the removal of the ovary, practiced a generation ago, and as short-circuiting the intestine may occasionally do today, but in the first instance, quite as numerous as the second, toxins can hardly come into play; and as for the second, half the epileptics are surely not of unusually constipated habit, and more than one-half of them are born without ovaries. Perhaps, therefore, if surgical interference is at all indicated in genuine idiopathic epilepsy, it may yet be shown to be best directed toward the brain.

But I have sufficiently trespassed on your time. In closing, we must confess that the results obtained in brain surgery are not comparable to those in every other domain of surgery. But there is no cause to despair. That is always a child of ignorance. To be enabled to stave off blindness would alone make cerebral surgery worth while. But, for the most part, our failures are not due to ignorance, for scarcely in any other field have greater advances been made. Bit by bit the territorial centers of specializing functions are being delimited in the brain. The nature of the fluid in which the whole central axis is bathed is better understood, its ebb and flow and the nature of its absorption firmly established. Therefore, trephining, the initial step of every cerebral operation, empirically performed through centuries, should stand, and does stand today as the prototype of all operations that are based on pure reasoning; for in no other instance is an intelligence of the highest order so essential in leading to and directing the act itself.

STONE CASTS OF THE RENAL PELVIS AND CALICES— ROENTGEN FINDINGS IN SEVEN CASES, WITH THEIR CLINICAL HISTORIES.

By SAMUEL B. CHILDS, M. D., Denver,

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Large stones filling the kidney, pelvis, and calices have been mentioned by a number of writers. Riolan in 1649 is given credit for first mentioning and describing this condition. From their striking resemblance to coral they have been called "coral stones." From the roentgenological standpoint one is impressed with the strong similarity of their appearance, upon the roentgen plate, to the shadow cast by the pelvis and calices when injected with collargol, thorium, or other substance opaque to the rays; hence the writer has seen fit to classify them as stone casts, in contradistinction to the single or multiple stones so frequently found. A description of the ordinary single or multiple kidney stones is found in the works of Hippocrates. These latter, in their development and growth, do not attempt to conform ordinarily to the shape or size of the pelvis of the kidney, and, apparently, have a different method of formation, although composed of practically the same ingredients.

The etiology of kidney stones is not definitely established. Ebstein and Kleinschmidt think that most calculi are formed originally in the tubules of the kidney. Chetwood states the most important cause that exercises in any sense a specific influence is situated in the kidney itself, and is, therefore, local—such as microorganisms, which may, in combination with mucus, fibrin, etc., become the primary focus of crystalline deposit.

Williams arrives at the following conclusions: "In a series of very simple experiments I have ascertained that deposit of certain salts in the urinary tract may be influenced indirectly by overplus elimination, concentration of the urine, presence of organic matter, and so on, but that deposit *in vivo* is directly accounted for by the action of certain ferments, doubtless of microbic origin."

In a paper read before the section of medicine in the Royal Academy of Medicine in Ireland, April 23, 1915, Smith states among his conclusions the following: (1) Urinary calculi are varying mixtures of crystalloids and colloids. (2) The chief factors involved in their formation are: (a) altered or perverted metabolism, (b) defective oxidation, (c) alterations in the reaction of the urine. (3) The relations between colloids and crystalloids—i. e., physicochemical factors—are of prime importance in the

etiology of urinary concretions. (4) Bacterial infection is probably a potent factor, and operates both in the kidney and the bladder, and may occur either as a primary or a secondary factor.

The fact seems recognized at the present day that crystalloids and irreversible colloids are two essential factors in the formation of a stone, for without the presence of such a colloid the presence of only sand in the urine should be expected, as the cementing material necessary to convert sand into stones is absent. The formation of the colloid seems best accounted for by the presence of an inflammation from an infection of bacterial origin. Kleinschmidt and others think the organic meshwork which is present in crystals, even when they are made to form in urine *in vivo*, is an accidental accompaniment of the crystals, yet they admit that it is of some help in holding the forming stone together.

It is a well-known fact that stones, especially in the bladder, are formed occasionally around a foreign body, but the detection of a nucleus other than crystals in kidney stones is so uncommon that some cause other than the presence of a foreign body as the formative nucleus of these stones must be found.

If, then, we accept the theory that crystalloids, irreversible colloids, and bacterial infection are the necessary factors in the formation of the great majority, if not all, of the kidney stones, it still remains one of the inexplicable facts in the human mechanism, which science has failed to solve, that in the presence of these elements in one case a stone is formed, while in another case in which the same elements apparently exist no stone develops.

The clinical history of the following selected cases, referred to the writer for a roentgenological examination of the urinary tract during the past two and one-half years, is of interest, especially in showing the great discrepancy that exists in these cases of stone casts between the comparatively mild symptoms present and the serious, even grave, condition revealed by the roentgenogram, this condition being verified in some of the cases by a subsequent operation, and in one of the cases by the death of the patient in a few months. In the latter case the extent of the bilateral involvement of the kidneys was such that an operation was considered inadvisable by several surgeons.

CASE I.

Mrs. A., aged 35, referred by Dr. Buchtel, March 16, 1916. Patient has complained of localized, nonradiating, dull pain in the region of the left kidney for a long time, but has never had any symptoms referable to the right kidney. No frequency of urination complained of, and no bladder symptoms present. A diagnosis of Dietl's crisis had been made by a physician in an adjoining town. The roentgen examination was made at the time of the cystoscopic examination with the ureteral catheters *in situ*, and, following the writer's universal practice in these cases, one set of plates was made before

and another set directly after the collargol injection. The first set of plates showed large bilateral stone casts, and the second set showed no change in the right kidney shadow and but slight change in the left—no collargol, apparently, having entered the pelvis of the right kidney and only a small amount that of the left, where it is seen in a dilated upper calix. These conditions are shown in Figs. 1, 2.

Guinea pigs were injected with the catheterized urine from each kidney. The pig injected with the urine from the left kidney died in three days from septicemia; the one injected with the urine from the right kidney died in about three weeks from tuberculosis.

Subsequent History of Case.—The left kidney was operated March 20, 1916, by Dr. Buchtel. The kidney was opened wide and the stone cast removed. The operation on the right kidney was performed May 30, 1916, and, as in the first operation, the kidney was split open and the stone removed. In each kidney the stone casts were very adherent to the pelvis and some effort was required to detach them from the walls. The lining membrane in each pelvis was thickened, inflamed, and granular. The stone cast from the right kidney weighed 846 grains and was composed of calcium and magnesium phosphate. Photograph of this stone (actual size) is shown in Fig. 3. The stone cast from the left kidney was not weighed and has been lost. Estimated from its size, however, its weight was slightly less than that of the right. The patient made an uneventful recovery, and was reported well in October, 1916.

CASE II.

Mrs. R., aged 24, referred by Dr. Waring, August 1, 1916. Her father died of tuberculosis of the lungs at the age of 48. For seven years from the time the patient was 8 years of age she had a pain in the region of the left kidney, which lasted from a few hours to one or two days, and she was obliged to miss about one day per week from school during this time on account of the pain. Without any apparent reason therefor, the pain disappeared for eight years and has returned only within the past twelve months.

The patient was sent to Colorado within the past year for lung trouble, and definite tuberculous lesions, including a small cavity, were demonstrated in the upper part of the left lung, both by a roentgen examination and by physical signs.

About July 20, 1916, patient had a sudden sharp attack of pain referred to the left kidney. Pus and albumin were present in the urine. The roentgen examination of the kidneys and bladder showed a stone cast of the pelvis of the left kidney, with two small nodules in the lower calices (Fig. 4). No tubercle bacilli were found in either the voided or catheterized specimen. Guinea pigs were injected with the urine from the left kidney; the pigs were killed at the end of six weeks, but no evidence of any tuberculous lesion could be found.

The report of the cystoscopic examination by Dr. Lyons is as follows: Bladder is negative, ureteral mouths normal, catheters passed to the pelvis of each kidney—the urine flowed twice as rapidly from the left kidney as from the right; urine from left kidney is pale-yellow in color, cloudy, acid reaction, containing many pus cells, no blood, positive trace of albumin; urea, 9/10 of 1 percent; no casts and no tubercle bacilli found; right urine is clear; urea,

55/100 percent; negative for pus and albumin, negative for tubercle bacilli, an occasional red blood cell found—probably occasioned by traumatism in catheterization.

Subsequent History.—The calcareous deposits were removed by Dr. Waring, of Savannah, Ga., in November, 1916. The larger concretion weighed 86 grains, and the smaller from the lower calix weighed 3 grains. Both were uric acid concretions. The kidney was slightly enlarged, pelvis a little dilated, but no evidence of tuberculous infection was seen. At last report patient was doing well.

CASE III.

A. M. D., aged 30, referred by Dr. Lyons, July 18, 1916. Has had considerable trouble with tonsillitis for several years; averages two attacks a year, which last about two weeks each time. Urethral infection in 1900, which lasted for two weeks without complications.

Present symptoms, in February, 1916: First noticed in 1915 that his urine became a dark-red, and later of a chocolate color; this discoloration lasted a few weeks; on a few occasions has passed blood; soon after the discoloration was noticed, frequent urination, with considerable burning and tenesmus, developed. An intermittent discoloration of the urine has persisted to the present time. Tenesmus and frequency of urination have increased; he now passes his urine every hour during the day, and three to five times at night. Has had chills and sweats, but is not positive about fever. Patient has been troubled with pain in the back referred to the right renal region, but has attributed it to a shortening of his right leg due to an old fracture. Prostate rather large, soft, and tender, and its secretion contains a few pus cells. Urine contains much pus and blood. Patient's symptoms did not improve under treatment, and in July, 1916, he was referred for roentgen examination. A stone cast of the right pelvis was found (Fig. 5).

At this time Dr. Lyons made a cystoscopic examination, and his report is as follows: Bladder is negative; ureteral catheters passed to pelvis of each kidney; 20 c.c. collected from right kidney; specimen pale-yellow, cloudy, acid in reaction, contains pus and blood, pelvic and renal epithelium; urea, $\frac{1}{2}$ of 1 percent; 40 c.c. collected from left kidney; specimen practically normal; urea, 3 percent. Guinea pigs injected with urine from right kidney; at end of six weeks pigs showed no evidence of disease.

Subsequent History.—Patient operated by Dr. Lyons and the stone, removed through an incision in the pelvis, was found to be composed of uric acid. Patient made an uneventful recovery and has been free from symptoms to the present time. A photograph (actual size) of the stone is shown in Fig. 6.

CASE IV.

Mr. E. H. S., aged 49, referred by Dr. Hall, May 27, 1914. Gives history of having passed a stone from the kidney in 1901. Came to Colorado in the late 90's for his health. His father and mother died of tuberculosis. In 1904 the patient had an ulceration and infiltration of the left vocal cord and arytenoid. No tubercle bacilli were found at this time, but abundant moist rales were present in the right apex, and at this time the diagnosis of tuberculosis of the lungs was made by Dr. J. N. Hall. In 1914, at the time of the roentgen examination, Dr. Hall still finds many moist rales in the whole

right lung; to a less extent in the upper left lung. Much pus and blood are present in the urine, and patient voids his urine four to six times each night. His present weight is 150 pounds; his maximum weight is 175. He complains of no particular pain in either kidney region. The report of the cystoscopic examination made by Dr. T. L. Howard is as follows: The bladder is moderately inflamed, with a few small areas of ulceration. There is a reddened area about the right ureteral opening, also a gaping eroded mouth of the left ureter. There is a rapid continuous flow of turbid urine from the right ureter, and 8 c.c. were aspirated from this ureter. There is a normal flow of clear urine from the left ureter. The examination of the urine from the right side shows pus cells and crystals; that from the left shows red blood cells, pus, and crystals. From the cystoscopic examination the evidence was considered sufficient to warrant the diagnosis of tuberculosis of the kidneys. The roentgen examination showed extensive bilateral stone casts of the pelvis and calices (Fig. 7).

Subsequent History.—The patient consulted several surgeons in different parts of the country, but in each case an operation was advised against. The patient died from cerebral thrombosis a few months after the detection of the stone casts.

CASE V.

A. J. B., aged 27, referred by Dr. Hall, September 25, 1916. Was operated in 1910 for a ruptured appendix. Following his recovery he remained well until 1911, when he was suddenly stricken with a severe pain in the left kidney region. In an eastern city three roentgen examinations of the left kidney failed to show a stone, and on exploration of the left kidney six weeks later no calculi were found. A profuse secondary hemorrhage followed the operation, and, ordinary methods failing to stop the bleeding, the kidney was removed five days later. There never had been any pain or symptoms referable to the right kidney until August, 1916, when he was admitted to St. Joseph's Hospital, Denver. He has no evidence of tuberculosis from the usual clinical methods of examination, and no history of any in his family.

No cystoscopic examination was made. The urine contained a large amount of pus, some blood, and kidney epithelium. Patient's present weight is 177; his maximum weight is 185.

The roentgen examination revealed a stone cast of the right kidney pelvis and discrete casts of some of the calices (Fig. 8). In the region of the left ureteropelvic junction is a shadow which is interpreted as probably a stone in the stump of the ureter.

Subsequent History.—This patient has not been operated upon, but the roentgen findings seem definite enough to warrant the diagnosis as made.

CASE VI.

M. R., male, aged 40, referred by Dr. Spitzer, October 27, 1915. He was then a patient at the National Jewish Hospital for Consumptives in Denver. Physical findings of his chest, as reported by the hospital, are as follows: Moist rales at the base of the left lung, with slight involvement of the right apex. No tubercle bacilli were found in his sputum while he was an inmate of the hospital. His general condition was good. Clinical diagnosis: tuberculosis of both lungs.

Since 1913 has had an indistinct sensation not amounting to a pain in the back to the right of the spinal column. Since 1914 has had frequency of

Childs: Stone Casts of Renal Pelvis and Calices

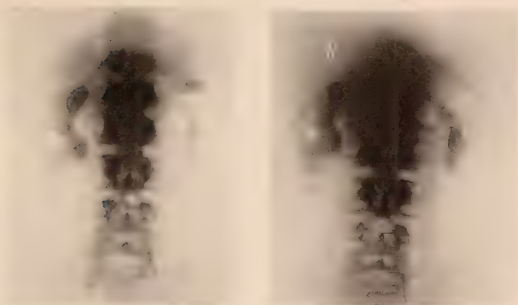


Fig. 1.

Fig. 2.

Fig. 1.—In the lower part of the illustration is seen the shadow of the ureteral catheters in situ. This plate was made prior to the collargol injection. A complete stone cast of the right pelvis and calices is shown. Two of the stone concretions in the calices are connected to the main pelvic cast by narrow necks of lessened density, indicating a weak union. The left kidney shows a stone cast of the pelvis, with broad stems extending toward the upper and lower calices. For clinical history see case 1.

Fig. 2.—Same case as shown in Fig. 1. This illustration, however, shows the stone casts after the injection of collargol. No change is seen in the stone cast in the right kidney. Some collargol has passed into a dilated upper calyx of the left kidney. Note the similarity of the shadow made by the collargol to that of the stone cast.



Fig. 3.—An illustration from a photograph of the stone cast ($2\frac{1}{4}$ by $3\frac{3}{4}$ inches) which was removed from the right kidney, shown in Figs. 1, 2. Weight of stone, 346 grains.

Childs: Stone Casts of Renal Pelvis and Calices



Fig. 4.—Stone cast of the pelvis of the left kidney, with two small branching nodules from its upper and lower pole. Two small stone nodules are in the lower calices, quite separate from the main cast. Shadow of slightly enlarged kidney is plainly seen. For clinical history see case II.



Fig. 5.—Stone cast of the right kidney pelvis, with stems extending into the calices and ureter. For clinical history see case III.



Fig. 6.—Illustration from a photograph of stone cast (actual size) removed from right kidney, shown in Fig. 5.

Childs: Stone Casts of Renal Pelvis and Calices



Fig. 7.—The right pelvis to the ureteral junction is filled with a stone cast, and, branching downward, continuous with the pelvic cast are seen the cast of the inferior calices. The three stone casts to the external side of the pelvis are located in calices and are not connected to the pelvic cast, denoting a separate focus of stone formation in the calices and pelvis. The pelvis and lower calyx of the left kidney contains a similar stone cast, and nearer the spine is a circumscribed cast, which is probably in a calyx. For clinical history see case IV.



Fig. 8.—A stone cast of the right pelvis, with separate stone nodules in the lower calices. The arrow points to a stone nodule in the stump of the left ureter, the left kidney having been removed. For clinical history see case V.

Childs: Stone Casts of Renal Pelvis and Calices

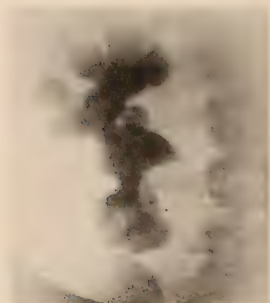


Fig. 9.—Very large stone cast of the pelvis and calices of the right kidney, also several discrete stone nodules inferiorly and externally to the pelvic cast, without any evidence of contact therewith. The large stone mass, located inferiorly to the pelvis and partially overlapping it, is interpreted as being in an abscess cavity in the kidney as viewed in the stereoscope; this mass is seen anterior to the plane of the pelvis and calices. The stone cast of the upper oblique calyx is shown in the stereoscope to be hollow in the center, resembling a conical tube. For clinical history see case VI.

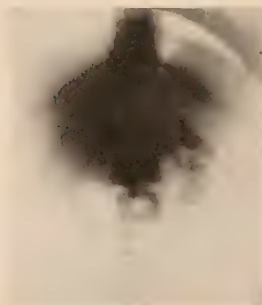


Fig. 10.—Stone cast of the pelvis of the left kidney, with separate stone nodules in the calices, showing no contact with the main pelvic cast. A stone cast is seen in the pelvis of the right kidney, with stems extending toward the upper and lower calices. The right cast resembles somewhat the figure of a bird. For clinical history see case VII.

urination, particularly at night, having to empty the bladder three or four times each night. Urine contained pus in large quantity, was acid in reaction, and tubercle bacilli were found in the urine.

The cystoscopic examination report by Dr. Spitzer is as follows: Both catheters entered the ureters readily; left urine was clear; right urine consisted of nearly pure pus and contained no urea, while the urine from the left side showed 3% percent urea. The bladder mucosa was inflamed about the right ureteral mouth, and several tubercles were seen in this inflamed area, the ureteral opening presenting a "golf hole" appearance. The left ureteral opening and the left side of the bladder mucosa were normal.

From the bladder appearance alone, both Dr. Filipp Kreisel, of Chicago, and kidney pelvis and calices, and in addition one large stone mass considered to be in an abscess cavity in the kidney proper, as in the stereoscope this mass is seen anterior to the plane of the pelvis and calices (Fig. 9). Note also conical tubular cast in the upper oblique calix. No concretions found in the left kidney.

Subsequent History.—The patient refused an operation on the ground that he did not have any symptoms referable to the right kidney, and considered that an operation was entirely uncalled for. Advice and arguments from the attending surgeon proved futile. The patient has since passed from observation.

CASE VII.

Mrs. T., aged 26, referred by Dr. I. B. Perkins, December 28, 1914. Drs. Hall and Hill, of Denver, found cystin and pus in her urine, also blood and cocci. She was having pain in her back. Her temperature, however, was normal. In April, 1909, the right kidney was operated by Dr. I. B. Perkins, who found a pyelitis, with a thick lining membrane, but no stone or concretions. In the spring of 1913 she had an attack of renal colic and passed two small stones from the left kidney, which were considered by Dr. Hall to be cystin stones. She was married in June, 1914. Sometime in the latter part of July of the same year she began to have pains in her right side over the region of the appendix and lower down, with an increased frequency of urination. At about this time or a little later she began to have morning sickness and vomiting, which grew steadily worse. This vomiting continued up until her confinement in April, 1915. The roentgen examination was made on December 28, 1914, at which time she had been pregnant about five and one-half months, and showed large bilateral stone casts (Fig. 10).

Subsequent History.—It was decided by the attending physicians to allow the pregnancy to proceed, in spite of the presence of the extensive bilateral stone deposits. She made an uneventful recovery after her confinement, and there were no complications at the time. Her weight, which was 130 pounds at the time of her marriage, dropped to 75 pounds at the time of her confinement, and in 1916 she weighs 112 pounds and feels well most of the time. After the confinement the pains in her back and sides ceased, the vomiting stopped, her appetite improved, and the urine cleared almost entirely of pus.

To the writer's knowledge only three of the cases just reported have been confirmed by operation, but the roentgen findings are

so definite in the remaining cases that he feels there is no doubt of the accuracy of the diagnoses.

Accepting these findings in the series of seven cases, four had bilateral stone casts, or 57 percent—a higher percent than is found with the ordinary stones in the kidney. Grau in a series of 90 cases of kidney and ureteral stones reports bilateral stones in 16.6 percent. Kapsummer found at autopsy 22 out of 73 cases of renal calculus bilateral.

In connection with the theory that an inflammation of bacterial origin is one of the elements necessary to produce stone casts, the following family and personal histories, abstracted from the above cases, are of interest. Two of the cases had a family history of tuberculosis, and each of these had a personal history of tuberculosis of the lungs, and one of them of tuberculosis of the kidney as well. Two other cases had a personal history of tuberculosis—one of the lungs and kidney, the other of the kidney only. One case had a history of urethral infection, with presence of pus in the prostatic secretion at the time of examination. One case had a pyelitis, with thickened mucosa, as demonstrated by operation five years prior to the detection of the stone cast. The remaining case has no clinical history of infection, but at the present time no report has been received of the nature of the infection that exists in the pus-laden urine.

If these stone casts are formed from stones that originated as an ordinary small calculus, there should be evidence of the passage of small stones or evidence of attempts to pass them, as evidenced by renal colic, oftener in these cases than their history indicates. In the seven cases of stone casts cited—four bilateral and three unilateral—only two give a history of having passed a kidney stone or attempts to pass a stone. One of these cases passed a small stone thirteen years and the other two years prior to the time of the roentgen ray examination. In each of these cases extensive bilateral stone casts were demonstrated by the examination. In one of these cases the right kidney pelvis had been opened five years prior to the time the patient came under the writer's observation, and no calculus deposits existed in the pelvis or calices, although a definite pyelitis was demonstrated as above mentioned. Furthermore, in three of the stone casts that were removed no distinct evidence of striation or concentric lamination was seen, as is usually the case in the ordinary calculus.

The fact that the majority of the kidneys in this series have discrete stone formation in the calices, entirely separate from the large pelvic cast, indicates that different centers of stone development originated at about the same time.

From a study of these facts it would seem that stone casts are probably formed in the following manner: There first exists an

inflammation of the mucosa of the pelvis and calices due to an infection, and, as a result of this infection, the lining membrane, as a whole or from separate centers in the pelvis and calices, becomes incrustated with a layer of crystals, which layer gradually increases in size by augmentation of fresh crystals, thereby narrowing the caliber of the canal until a complete cast is formed. In support of this theory, although in only one of the cases can a tubular cast be seen upon the stereoroentgenogram, this one case lends credence to the idea; and, again, the fact that these casts are very frequently found attached to the mucosa admits of the explanation that they were originally formed adherent rather than that they became adherent subsequent to their formation.

When the cast starts from discrete centers in the pelvis and calices, the separate casts probably eventually unite, but, in case complete union does not take place, the condition ordinarily termed a fracture between the pelvic cast and stems ensues. The explanation that one finds for this condition in the literature is that the break was occasioned by movements of the patient's body—and this without any more, if as much, proof of the same as is brought forth in this paper to substantiate the fact that stone casts develop from separate centers and occasionally do not unite.

SUMMARY.

1. Bilateral stone casts in this series of cases occur in 57 percent—a much higher percent than has been found reported in the cases in which the ordinary calculus has been demonstrated bilaterally.

2. The majority of these cases were free from renal colic, and had never had any definite sharp pain referred to the affected kidney or kidneys.

3. Infection is present in every one of this series of cases; it is impossible to say whether the infection preceded the formation of the stone cast or vice versa, but in case VII a definite infection of the right kidney pelvis was demonstrated prior to the formation of the cast.

4. Tuberculous infection of the affected kidney was present in three of the seven cases, or more than 42 percent.

5. Evidence is present to show that these stone casts are formed in a different manner from the ordinary renal calculus, even though the method of formation of each is not definitely known.

6. What has heretofore been reported as a fracture of large stones is probably a failure of union of discrete portions of a stone cast.

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THE TREATMENT OF GOITER BY THE ROENTGEN RAYS.

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Results obtained during the past ten, and particularly the last three, years since Coolidge tubes have been used have given the roentgen rays an important place in the treatment of goiter. Because the roentgen rays have such pronounced effect on epithelial cells, it is to be expected that definite beneficial results can be produced, since it has been definitely established that the glandular epithelium of testicles, ovaries, breast, liver spleen, thymus, thyroid and lymphatic glands are more susceptible than the glandular stroma.

Investigations have shown that the rays given off both the radium and the x-ray tube act primarily on the nuclei of the cells and inhibit their power of proliferation before the function of the cell is impaired. Embryonic cells and those which are undergoing active proliferation are the most susceptible. Malignant growths are retarded by radiation and become less malignant, although they may not have diminished in size or disappeared. By further increasing the quantity of radiation, the injury becomes more pronounced and the cells are completely destroyed, the rays acting differently on the various types of cells—destroying one kind of tissue and leaving the other adjacent tissue intact or so slightly injured that it will completely recover. These observations have been made by many, and the conclusions established beyond a doubt. They, therefore, explain how the roentgen rays decrease the size of the thyroid, reduce its over activity, and relieve the symptoms in goiter.

Tremendous advancement has been made in recent years in our knowledge of the physiology, pathology, and treatment of the ductless glands. Improvement has been shown in exophthalmic goiter by treating either the thyroid, thymus, or ovaries alone, but until lately in most of the cases the thyroid alone had been treated. It is known that thyroidectomy does not always remove all the symptoms of Graves' disease, and that many times the patient is greatly benefited by roentgen treatment of the thymus and ovaries afterward. Many of the European investigators consider hyperplasia of the thymus closely allied with exophthalmic goiter, and some have reported that the thymus is enlarged in 90 per cent of cases. Attention has been called to the fact that, when the thymus gland is greatly enlarged, the patients do not stand operation well and that

such patients suffer severe shock from operation, sometimes followed by death. Since the thymus gland seems to play such an important part in producing the symptoms of Graves' disease, and the danger from operation is greater when the thymus is enlarged, at least roentgen treatment of the thymus should be given. Sufficient results have been obtained by many roentgenologists and in various clinics to justify the conclusion that all cases should be given a fair trial by the roentgen rays before operation is advised.

Treating the thymus, I believe, is not alone sufficient to obtain a permanent cure in most cases, and we should in nearly all cases treat both the thyroid and thymus, directing most of the treatment to the thyroid, and deciding this the same as the surgeons do by clinical symptoms. If the thymus is not enlarged, the results would be unsatisfactory.

Goiter has been divided into three groups: first, the ordinary type or adenoma, which does not produce any symptoms except enlargement of the thyroid gland, and is often accompanied by more or less nervous symptoms; second, the simple goiter, with beginning toxic symptoms; and third, enlargement of the thyroid, often accompanied by changes in other ductless glands, with typical symptoms of exophthalmic goiter. There are three well-known forms of treatment of goiter at the present time—namely, medical, roentgenological, and surgical. The medical should always be considered first, as changes in the thyroid gland are produced by various conditions, such as infections, fatigue, pregnancy, shock, etc., and many times the symptoms will disappear when the patient is kept at rest under medical treatment. There came under my observation a case following postpartum hemorrhage, and within six weeks all the symptoms of goiter had entirely disappeared and the patient has never had any return.

Frequently you hear the statement that the nonsurgical treatment of goiter is attended with a higher rate of mortality than those treated surgically. The surgeon, like the roentgenologist, sees the failure of others. The surgeon usually sees the failures of roentgen therapy more often than the successes, and the surgical failures are being seen by the internist and are often referred to the roentgenologists. Roentgenology is not given the same credence in this country as it was in Europe before the war. There is no question that treating a case too long medically may be followed by permanent damage to various structures of the body, and, since roentgen treatment has proved efficient and is not dangerous in the hands of a skilled roentgen therapist, there is no necessity of delaying the treatment too long. The sooner roentgen treatment is given, the more promptly the symptoms will be relieved and the less radiation is required. Usually the younger the patient the more promptly the symptoms will yield.

When raying a case with grave thyroid autointoxication, it is necessary for us to begin carefully, because often, after roentgenization for a week or ten days, a stimulation of the gland with an increase of the symptoms may result. This is always followed by relief of the symptoms to a certain extent after the first series of treatments. If the case is exhausted, the mere moving of the patient from the room to the roentgen laboratory, in addition to the excitement caused by the treatment, may greatly aggravate the symptoms. In such extreme cases it is usually best to wait until the acute symptoms have partially subsided before giving the treatment. I had one patient referred to me for treatment in which the symptoms were extreme, and moving her from the bed to the stretcher and bringing her to the roentgen laboratory so greatly aggravated her symptoms that I am sure it was a dangerous procedure.

Now, with our present knowledge of roentgen rays in the treatment of goiter, patients should never be allowed to reach so precarious a stage before this method of treatment has at least been given a fair trial. Treating the thymus and ovaries is not sufficient, but the thyroid should usually receive the greater proportion of the treatment. Often patients suffering from goiter in the advanced stage are very easily discouraged, and, to avoid disappointments, it is important that you should have a thorough understanding with the patient before treatment is given.

Patients with simple goiters, having only enlargement of the gland and accompanied by nervous symptoms, will receive much benefit from a few roentgen treatments. The enlargement, which may be in only one lobe, can be checked and reduced in size, and the patient's health will be greatly improved. Raying a lobe of the thyroid is not any more dangerous than removing it surgically, because, if treatment is given carefully, you can stop on the safe side. In cases of simple goiter, which are just beginning to show symptoms of the exophthalmic type, roentgen treatment should be given at once, followed by one or two series, because nearly all of these will be promptly relieved.

In the exophthalmic type, where the symptoms are marked and damage has been done to other structures of the body, we must be careful in giving a prognosis as well as in giving the roentgen treatment. The gland in these cases is often easily affected, and the patient may be suffering from destruction or damage of the heart, nervous system, etc., and, instead of hypersecretions of the thyroid entirely, the patient is almost ready to pass from a hyper into a hypo condition. Then very heavy roentgen treatment is contraindicated. Lately I have had such a patient, who had all her symptoms relieved after the first few roentgen treatments. She gained 40 pounds in weight and her nervous system was greatly improved. This is a case which I believe will be myxedema, and, while the

roentgen treatment relieved her symptoms, it is a question if her thymus gland should not have been treated, omitting the thyroid at least at first.

The treatment of goiter by the roentgen rays is major roentgenological work, and should not be attempted unless the physician is familiar with the disease as well as the technic and physiological action of the roentgen rays on the thyroid gland. Keen advises that the operation should be performed only by a surgeon who has had experience and practice in the removal of the thyroid gland. This will apply to roentgen rays because we are dealing with a powerful agent.

Pfahler and Zulick, in an excellent article, "The Treatment of Exophthalmic Goiter by Means of the Roentgen Rays," published in the *American Journal of Roentgenology*, February, 1916, summarized the work done by seventy-six roentgenologists. The census of opinion among these authors was that the roentgen rays produce a favorable influence on goiters. The writers showed that it was utterly impossible to draw conclusions from any collection of statistics on this subject because the results reported show such a variation and indefinite technic that the reduction of the statistics would give us nothing accurate by which we could judge any future results. Today, since we are able to give an accurate dose, if the roentgenologists all had the same knowledge of the physiology, pathology, and chemistry of the thyroid and other ductless glands, we would soon be able to compare results.

The first improvement noted is the reduction of the pulse rate. Various authorities have found the decrease in pulse rate in 90 percent of the cases, and it is possible the best guide we have in regard to giving the treatment, because it has been pointed out that the stability of the pulse is as important as the reduction itself—that is, when it does not fluctuate with exertion or excitement. I have found that an increase in weight occurred in at least one-half to three-fourths of the cases after the first series of roentgen treatment. As soon as the pulse rate is reduced and becomes more or less stable, and the patient increases in weight, the nervous symptoms, such as excitability, insomnia, etc., improve rapidly. The exophthalmos improved in many of the cases which I treated. Some authorities state that improvement is noted in 50 percent of such cases. In my cases there was a reduction of the thyroid gland, at least to a certain extent, in over two-thirds of the cases of the exophthalmic type, and in about one-third of the cases the reduction was very marked. As before stated, we must go cautiously, and, when the hypersecretion is reduced to normal, we must stop treatment regardless of the size of the thyroid, because, if carried further, there is a danger of producing myxedema.

To illustrate, I report the following cases:

CASE I.

Miss A., aged 35, school teacher, had been compelled to give up her position on account of the symptoms of exophthalmic goiter. Both lobes of the thyroid were greatly enlarged, pulse was between 125 and 140 and very unsteady and marked, bulging of the eyes with impairment of vision, when she came for roentgen treatment. She had been treated medically for three years, with only temporary improvement at intervals. She was given fractional doses three times a week for three weeks, when her symptoms became aggravated, and she was compelled to remain in bed for two weeks. When she returned a week later, or three weeks after the last treatment, her neck showed a slight roentgen reaction and she was better than she had been for a year. Treatments were resumed at intervals for six months, when she was symptomatically cured. The pulse was reduced to 80, the thyroid reduced two-thirds in size, the exophthalmos greatly improved, and her vision was almost normal. It is now ten years, and she has been teaching ever since. In this case a beginner with a Coolidge tube, using the cancer technic, would most likely have done great harm. I advocate the use of the Coolidge tube, but judgment and care must be exercised.

CASE II.

Miss B., aged 16, was referred by Dr. E. B. Haworth with exophthalmic goiter. Her pulse was 120 to 140, thyroid greatly enlarged, eyes just beginning to protrude during the last three months, with the most uncontrollable nervous symptoms I have ever seen. She was symptomatically cured, and in nine months had gained 25 pounds in weight. It is now seven years since the treatment and she is in perfect health.

CASE III.

Miss H., aged 14, referred by Dr. Chavalier Q. Jackson with simple goiter, was extremely nervous and irritable. The enlargement of the thyroid was quite marked. At the end of six weeks all the nervous symptoms were relieved and she was a changed girl. At the end of six months the thyroid was almost normal in size. It is now seven years since the roentgen treatment was given and the patient is entirely healthy. Removal had been advised, but the parents refused to have an operation. About the same time I saw almost an identical case, which was operated upon, but the patient did not make the same recovery and she is very sensitive about the scar. I have treated quite a few similar cases, and I report this to show what is usually accomplished. There is a functional disturbance of the ductless glands in many girls between 12 and 18 years of age, and I believe a few properly selected roentgen treatments often restores normal activity. I would repeat that improper treatment has and will do harm even in these mild cases.

I could report many similar cases of my own, as well as the work done by others, which would serve to show that the roentgen rays are just as efficient as surgery in many cases.

There is a class of cases in which the value of roentgen therapy is too little appreciated even by men practiced in its use—the small or moderate-sized goiter of adolescent females with few or no symptoms. Hitherto the best advice we could give these cases was to let their goiters alone. Medical treatment offered them a problematical result, and, since the cosmetic consideration was of chief concern, a surgical operation, with its resulting scar, was considered

with reluctance. Moreover, the majority of these goiters disappeared spontaneously in a few years or in a few months. It is true, we are unable to say which cases belonged to the majority that would be cured by nature's method, or which ones would go on to a lifetime of chronic hyperthyroidism, the conversion of glandular into cystic tissue, with its resulting permanent unsightly tumor, which is always a potential danger by reason of mechanical pressure. In several such cases I undertook roentgen treatment, somewhat reluctantly, merely to secure a cosmetic effect. I was amazed to find that the treatment resulted not only in a distinct gain of weight and bodily strength, but also in the correction of a psychic instability which had been looked on as a matter of character rather than disease. From frivolous, flighty, irresponsible girlhood the patients passed into serene, well-ordered womanhood. In other words, they were suffering from hyperthyroidism, but in so slight a degree as to give no characteristic symptoms, but sufficiently to affect both physical and psychic strength.

When it becomes the custom to regulate, by judicious roentgenization, even minor aberrations of thyroid function appearing at adolescence, I believe we will not only prevent the chronic hyperthyroids and disfiguring cystic goiters of later life, but also add appreciably to the health and welfare of the community.

CONCLUSIONS.

The principal treatment should be directed toward the thyroid, but in many cases the thymus should also be rayed. Do not depend on raying the thymus alone, omitting the thyroid, unless it is where the thymus is greatly enlarged.

The treatment of goiter is major roentgenological work, and should not be attempted by anyone unless he is familiar with his technic and knows the physiology and pathology and needs of a clinical study of the ductless glands. A decrease in the pulse rate and an increase in weight are the first improvements noted. Reduction of the thyroid is not always marked when all the symptoms have disappeared, and the exophthalmos is the last to show improvement. Sufficient results have been produced to give all cases a fair trial; nothing is lost and many operations will be avoided. If the patient is greatly relieved after the first series of treatments, you must not consider the patient cured at this stage.

It is to be expected, if it is necessary to operate, the mortality will be lessened by preliminary roentgen treatment. The aim is to produce sufficient atrophy of the thyroid, so that it will produce a healthy amount of secretion and no more.

LAMINECTOMY FOR DIFFERENT LESIONS OF THE SPINAL CORD.

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This paper contains my personal experience with the operation of laminectomy at different levels of the vertebral column, and in the presence of various diseases and injuries of the cord.

In order to perform properly any operation, a knowledge of anatomy is essential. For the operation of a laminectomy this especially is true, and this information is not to be found in detail in every text-book, but numerous ones as well as many monographs must be consulted, and even a final visit to the dissecting room may be necessary to acquire a fair understanding of the subject of the anatomy of the spine and cord.

INDICATIONS FOR OPERATION.

1. The operation is indicated in the presence of tumor formation of the spinal meninges or substance of the cord.

2. In fractures of the vertebræ where the symptoms do not show a complete destruction of the cord at the site of injury. Otherwise operation is foredoomed to failure, at least as far as any improvement is concerned.

3. In injuries to the vertebral column or cord from foreign bodies, such as bullets, shrapnel balls, or bits of casings of high explosive shells.

4. In abscess formations following injuries or disease.

5. In meningitis, either localized or diffuse.

6. In spastic contractions and painful affection of the limbs.

7. And in any questionable condition where exploration might prove of benefit unless otherwise contraindicated.

Old age, diabetes, renal and cardiac diseases are contraindications to operations.

ANESTHESIA.

The choice of the anesthetic will be governed by the same conditions which determine the kind of anesthetic for any operation. Local, spinal, or general anesthesia may be employed. My choice, as a rule, is a general anesthetic administered by means of intratracheal insufflation of ether. The anesthetist is out of the way. There is no danger of respiratory failure, which frequently occurs

in laminectomies of the cervical region, and consequently, when the patient has been placed in position, the surgeon feels fairly safe as far as the anesthetic is concerned. Deaths from the anesthetic in cervical laminectomies are not uncommon, and, when once experienced, impress the operator with the need of the utmost skill on the part of the anesthetist. Those who do not use the intratracheal insufflation of ether in these cases are not giving their patients the best chance, for no other form of anesthesia is comparable.

POSITION.

After the patient is anesthetized and the intratracheal insufflation of ether established, he is placed flat on his abdomen. If for a cervical laminectomy, the head is brought well over the end of the table. The shoulders are raised by means of shoulder rests if the table is equipped; if not, by means of sand bags placed parallel with the body under the shoulders and outer ends of clavicle. The head may be supported by an instrument table, similar to the Hartley table, if the head rest is not available, and may be easily arranged in any position desired by simply raising or lowering the tray.

In whatever region the laminectomy is to be performed, the ventral position will be found very convenient. The most essential thing, however, is to provide against accident from interference of respiration.

TECHNIC.

The technic of the operation will of necessity vary in different parts of the spine. The cervical lamina are small and quite accessible, although hemorrhage is more troublesome. In the dorsal and lumbar region the spines are longer, the laminae broader and thicker, and deeply buried, although hemorrhage is not so troublesome and is easily controlled.

The operation for a lumbar or lower dorsal laminectomy which I have been using is performed as follows: A curved incision is made through skin and fat down to the vertebral fascia between points well above and below the first and last spinous process to be removed. This flap is dissected back to the spinous processes and a vertical incision is made on both sides of the spinous processes down to the lamina. The laminae are then cleaned of muscle with the periosteum elevator. Hemorrhage is readily checked with a hot pack. After a delay of a few minutes the hemorrhage will have been controlled, and the muscle can then be retracted either by an automatic retractor or by assistance. The interspinous ligaments are divided with the knife at the levels between which the lamina are to be removed, and the spinous processes are excised with a bone-cutting forcep. The Hudson burr is used to trephine the spine, and, except in the presence of fractures, is a very safe and easy

manner of removing a large part of the laminae. The bur is started at the base of the cut spinous process, the opening is enlarged with different caliber burrs, and one penetrates to the ligamentum subflavum without difficulty. The small pieces of the laminae remaining are readily removed with the rongeur forceps. The ligamentum subflavum is now incised or removed, exposing the dura. All hemorrhage has usually been controlled by this time, but, should there be any, it may be stopped with gauze sponges. The dura is exposed with a sharp knife. If this is carefully done, it is possible to open the entire length of dura without injury to the arachnoid, as I have demonstrated several times, and the cord is seen underneath as if through a glass. Two sutures on each side are passed into the edge of the dura, and a hemostatic forcep attached to each and allowed to hang over the side, their weight being sufficient to retract the dura. If the precaution is taken to place a strip of gauze between the dura and the lamina, no bleeding will take place into the dural sac. The arachnoid having been opened, the spinal fluid will escape. According to some authorities, the sudden escape of fluid does no harm, but I have always taken the precaution to lower the head of the table before opening the dura and allow the spinal fluid to escape slowly, and, if necessary, a small pledget of cotton can be inserted between the dura and cord at the upper end to control the escape of the cerebrospinal fluid.

The only variation which I make in this operation is in the cervical region when the laminae are small and easily accessible, and readily divided with rongeur forceps, and in the other regions in the presence of fractures when there is danger of making too much pressure on the cord unless the burr is started over an intact lamina above or below the seat of fracture. In fracture, therefore, I am inclined to remove the lamina with rongeur forceps and not use the burr.

CLOSURE OF WOUND.

If drainage is to be used, as in infections, a rubber dam drain is inserted to the dura, emerging at the lower angle of the wound and is fastened in place with a suture. When drainage is not indicated, the dura is closed with a running suture of cat gut or fine silk. Several silkworm gut tension sutures are deeply placed through all layers and left untied, to be fastened over a roll of gauze or through the lumen of short lengths of rubber tubing. The wound is then closed in layers, using No. 2 chronic cat gut. A few interrupted sutures will suffice to close the muscles, and the fascia is closed with a running cat gut suture. The skin, which is ready for closure, will be seen to overlap the line of incision in fascia, and thus tends to protect the deeper layers from direct infection. The skin is usually closed with a continuous suture of cat gut or silk. Skin clips are hard to place in such thick tissue as the skin of the

back, and would interfere with the comfort of the patient. The tension sutures are now tied, and the dressing of sterile gauze applied and retained with adhesive plaster and a swathe.

AFTER-TREATMENT.

Good nursing is an important part of all operations, but especially true in spinal operations. The posture which I usually employ is the dorsal decubitus. The patient is most comfortable. The position does not interfere in the least with normal healing, and, when drainage is to be employed, is ideal, as it favors free escape of cerebrospinal fluid.

Bed sores and hypostatic pneumonias are to be prevented by the use of the air cushions and frequent changing of position. All dressings and sheets must be perfectly smooth, and no wrinkles should be allowed. Alcohol rubs and the use of plenty of dry powder are indicated. All soiled linen should be changed at once, and incontinence of urine can be rendered harmless by the use of the urinal continuously or by the little trick of fastening a Paul's tubing over the penis and allow the urine to escape into a bottle at the side of the bed. Retention of urine must be met by catheterizing at regular intervals, extreme care being taken to prevent cystitis, since a large proportion of these cases result in death from ascending bladder infections.

MORTALITY.

The mortality from the operation of laminectomy should correspond to the lesion for which the operation is performed. In other words, in a group of cases of the same type of lesion, such as infections, the mortality of a laminectomy will be very high, whereas in a series of fractures of the lumbar region the operation should be followed by very low, or even a negligible, mortality.

Statistics have very much improved in the past few years. Harte (*Annals of Surgery*, 1905, p. 524) collected 92 published cases of operation for tumor and obtained a mortality of 28 percent, the principal cause of death being shock, hemorrhage, meningitis, and exhaustion.

Burghard, some years ago, collected the published records of surgeons of considerable experience, such as Horsley, Lane, Abbe, Chipault, Schede, and his own; a total of 70 operations for various conditions, and found a mortality of 17.1 percent. The cause of death in these cases he attributed to shock. Since then he has operated 49 times with 3 deaths, a mortality of 6.1. Statistics of individual operators vary within wide limits. Krause reported 28 operations, with 8 deaths; Hildebrand reported 35 operations, with 7 deaths; Horsley reported 24 consecutive cases without fatality; Elsberg reports that up to April 1, 1915, he has performed 120

laminectomies, with 10 fatalities, and had no death from the operation in 87 successive cases. In my series of 17 laminectomies I have had 4 deaths, but, excluding a group of cases which is not included in Elsberg's series (i. e., acute purulent meningitis), I have had the same mortality—12 laminectomies, with 1 death, a mortality of 8.3 per cent.

DANGERS.

From the foregoing statistics it would appear that the operation of laminectomy, in itself, should not be a formidable procedure. There are, however, certain dangers which must be avoided as far as possible, and in my experience are arranged in the following order of importance:

The anesthetic is important, together with the position of the patient, which has been outlined above. The intratracheal method of anesthetic is ideal, and it would seem almost impossible to have a fatality from the anesthetic with its use. The only patient I have lost was due to the anesthetic, which was poorly administered, together with a faulty position upon the table interfering with respiration.

Hemorrhage is usually profuse on incising the muscles of the back, and, unless readily controlled, considerable blood may be lost. One should make free incisions rapidly down to the laminæ, and immediately pack the wound with gauze or sponges wrung out in hot saline. This usually suffices to check all bleeding after a few moments. Any spurting vessels may be caught and ligated if troublesome.

Shock is sometimes severe, and, according to Burghard, is due mainly to the prolongation of the operation and to hemorrhage. I have had one such experience, but, as the whole operation lasted only forty-five minutes, I thought it due to the rapid escape of the cerebrospinal fluid, as it first appeared at the moment when the dura was incised. The patient rapidly recovered from the shock when returned to bed and the usual stimulants administered.

Injury to the cord must be avoided, when doing a decompressive laminectomy for tumor or fracture, by care in removing the laminæ. The too rapid escape of cerebrospinal fluid, which has been especially warned against, may be prevented by lowering the head of the table or by packing a bit of cotton between cord and dura.

The danger of sepsis, which seems to deter many from advocating the operation, is much exaggerated, and one finds very little in the literature of the present day to warrant such a dread. We do not fear to advise exploration of the abdominal, chest, or cranial cavity, and therefore should not hesitate to advise a laminectomy.

In order not to weary the reader with the details of case reports, I have collected the cases into four groups, giving the nature of the

lesion for which the laminectomy was performed, the result of operation, and the mortality of the individual group.

Group I. *Drainage in acute purulent meningitis.* There were five laminectomies for drainage in acute purulent meningitis after the method advocated by Barth a few years ago, which consisted in draining the dural sac by a tampon insert at the level of the third lumbar vertebra.

There were two cases of streptococcus infections, which recovered promptly following laminectomy. These were reported in detail in the *Journal of the American Medical Association*, June 19, 1915. One case of pneumococcus infection was slightly better following operation, but died twenty-four hours later. There were two cases of staphylococcus infection. One of otitic origin died within a few hours, while the second case, resulting from a bit of shell casing in the brain, lived several days following drainage of both brain and spinal canal, and for a time was much benefited, although finally dying from his infection. Under this group two cases were saved and three died, making a mortality of 60 percent.

Group II. *Fracture of vertebrae.* There were five laminectomies for fracture. Two were for fracture in the cervical region and three for fractures in the lower dorsal or lumbar region. One of the cervical cases died on the table from the anesthetic, which was administered by the open drop method, and also partly to a faulty method of supporting the shoulders, causing an interference with respiration. The second case of cervical fracture was slightly improved and died about four months later. The other cases of fracture were not helped by operation, although all left the hospital, and one at least is living four years after operation. The mortality from the operation in this series was 20 percent.

Elsberg believes that in experienced hands the danger of a laminectomy is small, and, if cases are carefully selected, the mortality in fracture cases will steadily improve.

If we are to get a perfect result from a laminectomy in the presence of incomplete cord symptoms, an early operation must be performed, since the constant pressure of bone will cause degeneration in the cord, from which recovery can never result. The same is true of intraspinal blood clot and edema, as demonstrated by Allen. Burrell collected 244 cases of fracture of spinal cord operated, with a mortality 65.5 percent. In the cervical fracture the mortality was 85.7 per cent; in the dorsal fracture the mortality was 76.7 percent; in the lumbar fracture the mortality was 50 percent.

Group III. *Gunshot injuries of the spine.* Out of thirteen gunshot wounds of the spine and spinal cord, most of which came under my care while serving on the western front as operating surgeon to the Twenty-third General Hospital British Expeditionary Force, France, four came to operation because of missiles imbedded in the

region of the spinal cord. There was no immediately mortality from the operations. One patient was invalided home not improved by operations and removal of shrapnel ball from the eighth dorsal segment of cord. One patient died a month later from inanition, following the removal of a bit of shell casing from the cord in the region of sixth spinal segment. The wound had healed perfectly. One patient paralyzed below the pelvis had recovered sensation midway down legs and was developing slight motion in his thighs when I left. One patient with a Brown Séquard syndrome was practically well when discharged to go home. There was no operative mortality in this series.

In incomplete lesion of the cord from the presence of a foreign body, operation should be performed, and the sooner the better, as the patients are often benefited by the decompressive effect of the operation. The same reason holds good for operating in this class of cases as in fracture.

Group IV. *Posterior root section.* I have had three cases which seemed suitable for posterior lumbar root section. One of those failed because I was unable to identify the anatomical landmarks, which had been interfered with by a previous laminectomy. Not having an electrode, I was obliged to stop further operative procedures.

The posterior lumbar nerve roots are easily identified if one is familiar with the anatomy of the ligamentum denticulatum. This ligament unites the pia of the cord to the dura on either side, extending from the foramen magnum to the last lumbar vertebra separating the anterior and posterior nerve roots. It is attached to the dura between the exits of the nerve roots. The last one ends opposite the first lumbar vertebra, making a fork-shaped extremity, one prong being attached to the dura and the other passing on down the side of the cord. The first posterior lumbar nerve root rests on this fork, which enables one to readily recognize it.

One patient had been paralyzed several years with contracted legs, and was unable to get about on his body and leg brace. At the suggestion of the neurologist, I did a posterior lumbar root section, and succeeded in producing a flaccid condition of his legs. Since then I have lost track of the boy.

The third and most striking case was a man shot in the chest, with a resulting painful paralysis of one side of the body below the level of the injury. The patient gradually developed a painful spastic contraction of the legs, requiring large doses of morphine to relieve the pain.

At the suggestion of Dr. Chaddock I did a post-lumbar root section, with the result that the man was soon up and about, and within a year was walking without crutches.

There were no deaths in this series.

Foerster collected 267 cases of post-nerve root division, with a mortality of 26 percent; Kuttner operated 32 cases, with a mortality of 2 percent; Eiselberg operated 12 cases, with no death; Elsberg operated 22 cases, with no death.

In conclusion, I believe that it has been shown that in careful hands, and with a reasonable care in the selection of cases, a laminectomy is a relatively safe procedure; that the mortality of operation corresponds closely to the mortality of the lesions when unoperated; that the recovery is more apt to be complete when operation is undertaken early, and is less complete when undertaken after a delay.

If an accurate diagnosis could be arrived at in all cases at the time of injury, the indications for operation would be clear. Unfortunately this is not the case, as Mixter, Monroe, and others have reported cases recovering after operation when the symptoms clearly pointed to a crushing lesion of the cord.

Since a perfect functional recovery should be one aim in operation, and because of the destructive changes which follow rapidly on bone compression, or the pressure resulting from intraspinal blood clots or edema, it would seem logical to advise early exploratory operation whenever there is the slightest doubt about the complete destruction of the cord.

THE DEVELOPMENT OF SCIENTIFIC MEDICINE IN AMERICA.¹

By C. F. HOOVER, M. D., Cleveland.

A very embarrassing question often asked American physicians is, Why should the medical schools of continental Europe contribute such a large part of progress in modern medicine and America contribute so little? The answer to this question, I think, does not lie in a comparative study of the intellectual capacity and intellectual ideals of the European and of the American. The answer lies rather in a comparison of the opportunities of the European with the opportunity of the American. I believe it is a perfectly fair statement to say the intellectual ability and ideals of the two are equal and equivalent. But why has the European source yielded so much and the American source yielded so little? If we compare the yield of America with that of Europe during the period from 1865 to 1890, we have almost nothing on this side of the Atlantic to balance the pioneer work of France and Germany in the fields of pathology, bacteriology, and clinical medicine and surgery. Since 1890, however, the balance has been gradually, and we may say rapidly, moving toward the horizontal. It cannot be said that we hold an equal position, for we had far to go to attain our present unequal position, and the balance must continue much further in its present course before we strike the horizontal. If I read aright the attitude of the American physician and the disposition of the public toward medical progress, there is a very hopeful prospect for American medicine. Ever since the original colonies ranged themselves together as a nation, the critics of the old world have prophesied we could attain nothing beyond mediocrity. Our critics thought we could never exhibit more than the spirit of the acquisitive mind; we were assured the inquiring mind would never find adequate nurture in a democracy where education was at the mercy of elective bodies of men who could never rise above mediocrity. It was believed that science and the arts could be fostered and promoted only where stipends lay within the hands of a favored few, as occurs in monarchic governments. Until the past twenty years it seemed as though the prophecies of our older cities would be confirmed in the delayed progress of American medicine.

In the past twenty years the inquiring minds of medicine have been fostered in a sufficient number of schools to drag at least a

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dozen teaching faculties out of the slough of mediocrity and place them on the firm ground of scientific inquiry.

And why should this not be true? One of the best refutations to the old-time reproach of mediocrity is found in the fact that America for nearly seventy years has led the world in astronomical science, certainly a scientific field which is less endangered from exploitation and commercialism than any other. The supremacy of American astronomy can be traced directly to the influence of Mitchell of Cincinnati. Mitchell was a West Point graduate, who was in the same class with General Robert E. Lee and Joseph E. Johnston. Mitchell stood first in his class. As a boy only 15 years of age, he tramped and worked his way from Lebanon, Ohio, to West Point. After about five years' service in the army he retired to civil life and became very greatly interested in astronomy. The invention of the astronomical clock and several other basic methods in astronomy are credited to him. In the early fifties he commenced giving popular lectures on the subject and appealed to the citizens of Cincinnati. They were asked to subscribe funds for the erection of an observatory. Adequate funds were raised by popular subscription, and Mitchell went to Munich, Germany, where his telescope was made. In the meantime his ideas of a telescope grew to such proportions that the entire subscription was required to pay for the telescope and there were no funds left to house the instrument.

On his return to the United States in 1856 the country suffered from such financial depression he could not appeal to the wealthier class for aid. Consequently he appealed to all the stonemasons, brickmasons, and carpenters of Cincinnati, who took stock in the observatory and gave their day labor as contributions. By the time the instrument arrived the building was prepared for its reception. Mitchell later gave popular lectures throughout the East, and aroused such popular interest in astronomy that within a few years many more astronomical observatories were erected.

At the outbreak of the Civil War Mitchell received a commission as brigadier-general and died during the second year of the war from yellow fever. He evidently could not refrain from talking on his beloved subject, for he was known very affectionately among his soldiers as "Old Star." The great influence of this one man and the exercise of his personal influence and personal magnetism are responsible for the supremacy of American astronomy from 1850 up to the present time.

The modest and inconspicuous character of this group of scientific men is well illustrated in the experience of a Cleveland gentleman of considerable local importance who visited St. Petersburg twenty-five years ago. This gentleman was introduced to a savant of St. Petersburg University, who said to him, "You have the honor to come from the same city as the great Stockwell." The Cleveland

gentleman unfortunately did not know who Professor Stockwell was.

Why did astronomy grow so strong in America when other sciences languished? Simply because the expense of maintenance for astronomy was much less than required in some other departments. We have had in America just as many idealists willing to devote their lives to scientific endeavor in medical sciences, but the cost of maintenance has been so great that an adequate support from the state was wanting. Thus far the old critics to whom I first alluded were right. In a democracy large sums of money cannot be appropriated for scientific research because our legislative bodies have not the vision to see how any benefit can come from mere inquiry into Nature's unknown ways. So long as research is directly allied to productive industry, the legislature is sympathetic, but, when research ventures into a field where profitable returns are not imminent, there is no appeal to our legislature.

This has put a large burden on the private citizen who feels his public responsibility, and, much to the credit of democracy, many patrons have cheerfully assumed the burden. This way of escape from the logical conclusions of democracy's critics was not foreseen. The results in at least ten institutions of advanced learning have been highly gratifying, and, so long as our private citizen is able and willing to do what is assumed by the state in foreign countries, our organization (though not so detailed) is adaptable to varying needs, and possesses a flexibility which has much to recommend it over the hard and fast statutory organization of the Continental university.

During the past year we have succeeded in making a break with the old hospital nursing home idea of the hospital, and have added to our medical clinic a group of men whose time is devoted largely to inquiry into some of the many problems which await solution. I do not mean to say that inquiry or research in former years was wholly neglected; no man who is in the habit of asking why of himself could witness the thousand and one phenomena which pass before his view in a hospital ward without doing some research. But it was of a desultory, bushwhacking kind of effort, which promised nothing for the future. There was nothing organic in the work which could be taken up by successive men. At the end of twenty years the hospital would have had nothing to offer to the successor of the present chief of the clinical service which the present incumbent did not have as he began his work—viz., the beds and the patients. There was no tangible policy of work, no fixed, purposeful organization which assigned this medical service a working position in the medical world. We received patients and treated them well, and learned something from our experience, but we were

doing little which would aid other men in their endeavor to study the nature and treatment of disease.

Happily we have made a beginning of progress in a new direction. Through the cooperation of our superintendent and the generous response of a number of friends we have been able to equip a laboratory and provide at least a living income for several men who are willing to devote their time and training to research work. Thus far the results have been extremely gratifying, and there can be no doubt that, within a few years at least, we can hope to have this very essential part of our work as amply endowed as our wards have been endowed in the past.

We expect to be always poor, always wanting and always asking. We should be open to grave suspicion if we were not, but we do feel sure that after productive work has had an unbroken continuity for a reasonable length of time we shall then be put on a less precarious financial basis than we now have. For the present we are profoundly grateful for our opportunities, and we feel confident that the near future will bring a full realization of security and permanence for our organized effort in research.

At present Dr. Pearce is working on the problem of respiration and heart function. We confidently believe within a short time he will be able to present a method for the study of respiration and cardiac function which will be very simple, and can be used in any hospital ward without the slightest inconvenience to patients. Dr. Pearce's work will contribute greatly to our knowledge of the function of ventilation of the lung, and give us a method for accurately measuring the output of the heart with each beat, and it will also give us a method from which we shall be able to formulate some definite standardization for the reserve energy of a heart. So far all the study of heart function has been expended on interpreting the correlation and mechanism of the heart's chambers, but there has been no scientific method produced from which we can accurately estimate the heart's work.

Dr. Christie is engaged in the Clinical study of biological chemistry in its relation to diabetes and Bright's disease. The application of physiological chemistry to clinical work is attended with great difficulty, and requires very laborious and painstaking work. Thus far the great amount of work which has been done on the subject has yielded comparatively small practical results, but, notwithstanding the great difficulties, new methods are being constantly devised. New conceptions on physical chemistry are coming to our aid, and it is very gratifying to be able to report that a part of our medical service is engaged in cooperating in this very difficult field.

Dr. Blankenhorn has been engaged in the study of bile pigment and bile salts throughout the body in health and disease. This prob-

lem has a very important bearing in the study of the blood and disease of the liver, and the origin and fate of the red blood cells.

I simply wish to indicate to you that the research work of our department has attained a working organization, and that our men are engaged in definitely formulated problems which will keep them occupied for many years, for, when inquiry has once started and formulated work once established, the continuation of the work will follow as a logical corollary. The fact that these men are willing to give up their opportunities for gaining a private practice makes them deserving of financial support which will give them a respectable living and provide them with every facility for work.

SURVEY OF MALIGNANT TUMORS.¹

By ELEANOR C. VINCENT,
Social Worker in Surgical Clinic.

In June, 1915, Dr. George Walker, surgeon-in-chief of the surgical clinic of the Johns Hopkins Hospital Dispensary, asked that efforts be made to make it possible for all malignant-growth cases to receive the treatment prescribed and to find out what became of those patients who were not admitted to the wards of the Johns Hopkins Hospital.

Acting on this request, cards, with name, diagnosis, age, nationality, and dispensary number, were made out by the clinic secretary for this type of patients. The file is kept by the social worker in conjunction with the other social work of the clinic.

Patients who have been admitted to the hospital are kept in touch with by the Surgical Pathological Department. As a great deal of their follow-up work is done during the summer months, and recent reports had not been received from many patients in the following group, they were written to by the social worker.

Of 3,326 new patients registered from June, 1915, to June, 1916, 95 patients with malignant growths were indexed. There was also a doubtful group of about 30 cases that were kept under observation pending diagnosis.

TABLE I. GROUPING AS TO AGE, SEX, AND RACE.

Parts affected	Under 20 years				20 years to 35 years				35 years to 45 years				Over 45 years			
	M.		F.		M.		F.		M.		F.		M.		F.	
	W.	C.	W.	C.	W.	C.	W.	C.	W.	C.	W.	C.	W.	C.	W.	C.
Buccal cavity.....	1								3				1	13		3
Stomach and liver.....									1							
Peritoneum, intestines, and rectum.....													3			
Female generative organs ¹											5	1				
Breast.....							1								13	7
Skin.....									1				12		5	
Others ²	1		1	2	1		1		3				6	1	7	2

¹These cases are not registered in the surgical clinic, but are treated in the gynecological and obstetrical clinics.

²Cancer and other malignant tumors of other organs or of organs not specified.

Table No. 2 shows treatment and result covering a period of twelve months.

¹Surgical Clinic, the Johns Hopkins Hospital Dispensary, June, 1915, to June, 1916.

TABLE II. CANCER AND OTHER MALIGNANT TUMORS.

Treatment and results	Buccal cavity		Stomach and liver		Peritoneum, intestines, rectum		Female generative organs		Breast		Skin		Others ³		Total
	-45	+45	-45	+45	-45	+45	-45	+45	-45	+45	-45	+45	-45	+45	
Operable—															
No recurrence.....	2								4	7	1	3	1	6	25
Recurrence.....	3								2	1			1		7
Died.....	6								2		1		1	2	12
Patient reports no recurrence.....	1								4				2		7
Lost track of.....	1				2						1		1		5
Inoperable—															
Progressive.....	2		1		1				1					1	6
Died.....	1								2					3	6
Lost track of.....									1						1
Radium—															
Improved.....											1	1			2
Progressive.....											1				1
Died.....															
Lost track of.....													1	1	2
X-ray—															
No recurrence.....	2										5				7
Recurrence.....											1				1
Improved.....															
Died.....											1				1
Lost track of.....													1		
Refused operation or treatment—															
Progressive.....	1								2		2		1		6
Died.....		1							1		1	1			4
Lost track of.....	1												2		3

³Cancer and other malignant tumors of other organs or of organs not specified.

THE RELATION OF SOCIAL WORK TO TREATMENT PRESCRIBED.

Cancer and Other Malignant Tumors of the Buccal Cavity.—Of the 21 cases comprising this group, 13 were operated upon, 3 were inoperable, 2 received x-ray treatment, and 3 refused operation or treatment.

Eight of the patients were operated upon in the Johns Hopkins Hospital, and 1 in the Johns Hopkins Hospital Dispensary. Two of these show no recurrence; 2 died while in the hospital. Three had recurrences; of these 2 had been discharged as improved and died four and six months following operation; the third had been discharged from the hospital as well. The remaining patient operated upon in the hospital was discharged as well and lost track of. The patient operated upon in the dispensary reports no recurrence.

Four patients were operated upon elsewhere. Two died after returning home, and the other 2 are under the care of private physicians.

Of the 3 inoperable cases, institutional care was obtained for 2 after the cooperation of the relatives was secured, and the third patient is living in the country and receiving no treatment.

Two patients who received x-ray treatment show no recurrences and report regularly for observation.

The 3 patients who refused treatment gave as their reason "fear." One has died, one lost track of, and the condition of the third is progressive.

In dealing with this group, thirty-two visits were paid and thirty letters written. Seven patients were from out of the city.

Stomach and Liver.—In this group there is but one patient. Efforts were made for six months to secure patient's cooperation. During this time her condition became inoperable, and it was necessary to secure financial relief through a cooperating agency. The patient has recently left the city, and efforts to locate her have been unsuccessful. Three visits were paid and two letters written in her behalf.

Peritoneum, Intestine and Rectum.—Three patients comprise this group. Two of them were admitted to the Johns Hopkins Hospital. One case was inoperable and has recently been admitted to a state hospital; the second was operated upon—result improved; he has been written to, but no reply has been received; the third patient was sent to another hospital, there being no vacancy in the Johns Hopkins Hospital—no reply has been received to letter sent asking report on present condition. Two visits and three letters were written to these patients, two of whom were from out of the city.

Breast.—The group consists of 27 patients, 20 of whom were operated upon, 4 were inoperable, and 3 patients refused operation or treatment.

Ten of the patients operated upon were admitted to the Johns Hopkins Hospital. Four of these were admitted to the hospital following adjustment of home conditions. Five patients report regularly for observation and show no recurrence. Two other patients report no recurrence. Two patients show recurrence, one of whom has received further treatment and the other refusing same.

Of the 10 patients operated upon elsewhere, social service arranged for the admission of 4. Of this group, 5 are under the care of private physicians, who report no signs of recurrence in 4 patients; the fifth patient refuses further treatment.

Two patients report no recurrence, 2 are being followed by other hospitals, and 2 patients died several months after operation. Home nursing was secured for 1 of these.

Of the 4 inoperable cases, 2 have died and 1 has been lost track of. It was impossible to secure home nursing for the fourth patient, due to the reputation of the negro physician under whose care he was.

Three patients refused operation or treatment. One has been lost track of, 1 secured home nursing and later died, and the third is being kept under observation.

Five patients in this group were from out of the city. Forty-one visits were paid and forty-five letters written in their interest.

Skin.—The total number of patients in this group is 18. Of these, 6 were operated upon, 7 received x-ray treatment, 2 received radium treatment, and 3 refused operation or treatment.

Of the 6 patients operated upon, 1 was admitted to the Johns Hopkins Hospital; result—well, no answer has been received to letter sent asking present condition. Three patients were operated upon in the dispensary following a visit to the home, and since operation they have been kept under observation; 1 shows recurrence and is receiving x-ray treatment. Two patients were operated upon elsewhere, one is under observation, and the second patient died following operation; he had been going to a "cancer specialist" and was in an advanced condition when admitted to the hospital.

Radium treatment was given to 2 patients. A recent report from 1 patient denotes improvement, and the second reports condition progressive.

Of the 7 patients who received x-ray treatment, 5 have been kept under observation and show no recurrence, 1 patient reports no recurrence, and the seventh patient has been lost track of. Three of these patients reported for observation after having been visited.

Three patients refused operation or treatment, 2 are being visited, and the third patient has died.

In dealing with this group of patients, twenty-eight visits were paid and forty-six letters were written. Three patients were from out of the city.

Other Organs or Organs not Specified.—Twenty-five patients are in this miscellaneous grouping, which consists of the following: flank region, 1; neck, 7; antrum, 3; arm, 2; parotid, 2; leg, 2; clavicle, 2; thigh, 2; wrist, 1; hand, 2; eye, 1.

Fourteen patients were operated upon, 4 were inoperable, 3 received radium treatment, and 4 refused operation or treatment.

Of the patients operated upon, 9 were admitted to the Johns Hopkins Hospital, and 3 were operated upon in the Johns Hopkins Hospital Dispensary. Seven show no recurrence, and 2 patients report no recurrence. One patient having recurrence was given radium treatment with good results. The remaining 3 operated upon died, 2 before leaving the hospital, and the third, who was discharged as well, died ten months later.

Arrangements were made for the admission to another hospital of 1 patient and her young baby. She was discharged well and has been lost track of.

Of the 3 inoperable cases, arrangements were made for the transportation of 1; for the second, home nursing was secured; and the third was persuaded to return to the Municipal Hospital, where he was previously an inmate.

Of the patients receiving radium treatment, 2 have been lost track of, and the condition of the third is so improved that she is now working.

Four patients refused treatment; 1 patient has died, 1 reports disease progressive, and 2 patients have been lost track of.

There were twenty-five visits paid to patients in this group, and thirty letters were written. Eleven patients were from out of the city.

GENERAL REMARKS.

The "cancer specialist" seems to find most of his patients in the rural or mountainous districts. Four patients, coming from the mountains of Virginia, West Virginia, and North Carolina, had been treated by a "specialist" before coming to the Johns Hopkins Hospital Dispensary. One patient, an old negress who could neither read nor write, was in an inoperable condition. She had paid \$10 a plaster. Another patient paid \$55 down, and, should cure be complete, \$45 more was to be paid; her condition had become greatly aggravated by the application of the plasters. The third patient had paid \$55 for two applications for a cancer of the breast; her condition became worse as a result of this treatment.

Two patients living in Baltimore received treatment from "quacks," and, through information secured from one patient, investigations are being made by the police department.

Surely some legal measures should be taken to restrict cancer specialists and quacks. They treat these patients during the time when surgical measures would give them relief, and they do not discontinue until the malignant growth is far advanced. The investigation made by the social worker shows that the majority of these men are ignorant, and many are registered physicians only under the grandfather's clause, and the chief of the clinic feels that it is not speaking too strongly when one says they murder many of the patients who come to them.

A number of patients, for some reason, would not have received treatment had not the social worker visited. The reason was not financial, as all but three patients of this group were of the thrifty, industrious class.

We feel that in all dispensaries someone should talk to these patients carefully and quietly, showing the necessity of operation. It is too often simply stated by the physician-in-charge, "You must go into the hospital and be operated upon." This only frightens them, and they leave, not to return. Some patients consulted physicians and had not been told their condition; so time was lost and the condition became inoperable.

The work, while it has been carried on only a short time, fully demonstrates that a real good, in many cases a life-saving, service may be accomplished. We believe that it is incumbent on all dispensaries to institute this follow-up plan.

THE STANDARDIZATION OF TUBE AND PLATE TECHNIC.

By F. H. KUEGLE, A. B., M. D., Omaha,
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There are good reasons for believing that roentgen rays are subject to the same general physical laws as rays of sunlight. Professor Bragg and his son have successfully refracted them through the grating afforded by natural crystal formations, such as rock salt, and Dr. Hull has used quartz in connection with the ionization chamber to determine measurements of roentgen ray spectra.

The following facts, taken from Daniell's "Principles of Physics," are pertinent: "Ether waves are capable of interference. Two systems of equal waves, arriving at the same point in opposite phases, will produce at that point no effect, either of light or of heat or of photographic action; at that point the ether waves will be at rest, and thus light added to light may produce darkness. Interference of waves thus affects the distribution of energy in a system of undulations, and produces a system of negative reflected waves."

With these physical principles before us, let us briefly analyze the production of light in the x-ray bulb. X-rays are produced by the bombardment of the antikathode by electrons. The kathode rays are centered on the target within a small area, the focal spot. From every point within this focal spot diverging rays of light are sent downward, provided x-rays emanate from the target instead of at the walls of the tube, as some physicists believe. From the very central point arises the central ray at a perpendicular. It is apparent that all those rays arising without the central point of the focal spot and passing downward and inward must meet the central rays at varying distances, depending on the angle of deflection at their origin.

The number of these interference rays is directly proportional to the size of the focal spot; the larger the focal spot, the greater the number of deflection rays produced, and, conversely, the smaller the focal spot, the fewer the number of deflection rays.

With the diffusion of light emanating from a given focal spot, the number of interference rays reaching an area of any certain size is inversely proportional to the square of the distance.

For the same reason, if the central ray is accurately focused on a certain area, the number of rays arising from a zone around the center of the focal spot reaching this given area will also vary inversely as the square of the distance. It is, therefore, obvious that

it is possible to increase the homogeneity of a bundle of diverging rays centered upon a given area, first, by decreasing the size of the focal spot to the minimum, as determined by the physical laws involved; second, by increasing the focal distance to a maximum, as determined by the endurance of the particular x-ray tube in use.

These are both factors of the highest importance, since the definition of radiograms is dependent on them, inasmuch as diverging and not parallel rays of light are used in radiography. This being the case, certain methods must be adopted in order to use successfully the kind of light rays at our disposal, to minimize distortion and destruction of detail.

The elimination of interference rays, in so far as possible, is highly essential, since we believe that they are mainly responsible for the loss of definition, and that object-secondary rays play a minor role in this direction.

Interference rays are sharply deflected at the point they strike the central rays, the angle of deflection depending on the particular wave phases at the time of contact. Striking outward in every direction, they cause much fogging of the plate, and this in turn results in a veiled or blurred image.

It is apparent that the shorter the focal distance is for a focal spot of any given size, the greater will be the loss of definition. These interference rays are the ones which are very effectually cut off by the Bucky diaphragm.

As noted above, the number of these rays reaching any given area of tissue is reduced inversely as the square of the distance; hence the importance of increasing the tube-plate distance to a maximum.

The possibility of increasing the focal distance sufficiently to give more nearly parallel rays for any given thickness of tissue traversed, and to minimize the untoward effects of interference rays, has been rendered more feasible than formerly by the introduction and greater stability of the hot cathode type of x-ray tube.

That the foregoing facts are of fundamental importance, and are not merely theoretical conceptions, is proved by the following practical test. We made a hip radiogram of a man weighing 300 pounds, measuring 9 inches through, anteroposteriorly at the center of Poupert's ligament. The focal distance used was 28 inches. It required an exposure of 27 seconds with 20 milliamperes current when 60,000 volts were being delivered at the tube terminals. This was a severe strain on our fine-focus Coolidge tube, but was within the limits of its endurance, since the target does not become incandescent with that amount of energy under about 30 seconds. The radiogram was highly satisfactory, showing excellent soft tissue and bone detail. It was, in fact, of as good quality

as hip radiograms of thin individuals made by the usual technic with a focal distance of 18 to 20 inches.

Our practical deductions are as follows: First, the smaller and sharper the focal spot when working at a fixed distance, the greater the definition of radiograms. Second, the thicker the part to be radiographed, the greater must be the tube plate distance to insure good radiograms. Third, the greater the focal distance, the more nearly parallel will the rays become for any given area of tissue traversed, and the fewer will be the interference rays reaching the plate to cause a veiled or hazy image. The angle of deflection of the latter will also be greatly reduced the farther the deflection occurs from the focal spot.

The above conclusions are a part of the basic principles on which the fine-focus Coolidge tube technic which we shall presently describe are based.

For the other principles which we deem essential to the perfection of an ideal bone technic we are greatly indebted to Dr. August Schönfeld, director of the roentgen department of the Kaiser Jubiläums Hospital of Vienna. His bone technic, briefly summarized, is as follows: "Mueller water-cooled tubes having a very small, sharp focal spot, and fitted with the Bauer air regulator for adjusting the vacuum, furnish the x-ray light. The quality of these tubes, when seasoned for use, is as follows: Measured with a Benoist-Walter six-division penetrometer when the tube is energized with $9\frac{1}{2}$ to $10\frac{1}{2}$ milliamperes current, the ray hardness is from $3\frac{1}{2}$ to 4. The voltage which is being delivered at the tube terminals under the above conditions varies between 55,000 and 60,000.

Given a tube of such quality, one need only to select that button of the rheostat of a particular transformer which will energize the tube with $9\frac{1}{2}$ to $10\frac{1}{2}$ milliamperes current. The converse is also true—viz., having one determined which button of the rheostat is required to energize a tube of the above-described quality with 10 milliamperes current, any subsequent testing of the tube may be effected by merely placing the rheostat control on this selected button and observing whether the milliamperemeter registers 10.

The exposure time required for any given part depends on its thickness, measured in centimeters, as determined after a long experience by the quality of the radiograms produced.

The application of this technic to the fine-focus Coolidge tube is not so easy as at first appears. True, one can select a rheostat button which will give 10 milliamperes current when 55,000 to 60,000 volts are being delivered at the tube terminals. Practically, however, the end results are a failure, since radiograms lack detail and are absolutely unsatisfactory. Now, why?

It will be noted that in the above-described technic a tube of a definite construction, pumped to a certain vacuum and energized with a definite volume of current at a fixed voltage, is essential for the production of radiograms of a high quality; in other words, a tube which gives off rays of a certain definite spectrum.

This spectrum, we believe, it is impracticable to produce with 10 milliamperes current with a fine-focus Coolidge tube, constructed as it now is. Let us briefly discuss the physical problems involved in the production of any given spectrum, and see why.

The quality or hardness or spectroscopic valuation of x-rays is determined by the following factors: First, by the density of the metal used in the antikathode; the denser the metal, the harder the ray. Second, by the size of the focal spot; the smaller the focal spot—or, in other words, the denser the cathode stream—the harder and more homogeneous the bundle of rays produced. Third, by the amount of current put through the tube plus the square of the available voltage at the tube terminals. Fourth, by the amount of loss incurred by the absorption of rays by the inner walls of the tube.

The Mueller roentgen ray tube has a tungsten target, and in this respect is similar in construction to the Coolidge tube. Its focal spot, however, is only about $1\frac{1}{2}$ mm. in diameter, whereas that of the fine-focus Coolidge tube is about 3 mm. in diameter.

It seems, therefore, logical to conclude that the Coolidge tube must be energized with twice the volume of current as the Mueller tube, having a quality of $3\frac{1}{2}$ to 4 Benoist-Walter six-division scale, at the same voltage to produce light of the same intensity. This conclusion is borne out by practical experience.

The details of our fine-focus Coolidge tube technic, based on all the foregoing facts, is as follows: We select that rheostat button of the particular transformer in use which will energize the tube with 20 to 21 milliamperes current when the filament is heated to back up a spark of 5 inches. This, we have learned by experience, gives us the best roentgen ray spectrum for radiographing tissues of the human body. Exposures are made at the uniform distance of 24 inches or 60 cm. We have adopted 24 inches as a standard distance simply as a compromise. It yields excellent radiograms of all parts measuring less than 7 inches, and good, diagnostic skiagrams of thicker parts. Even a Coolidge tube has its limitations, so, while we recognize the fact that a focal distance of 30 inches with a tube having a focal spot 3 mm. in diameter will give us still better plates, it is not economical or practicable to subject a tube to the long exposures it requires at that distance.

The following table gives the exposures necessary for the three kinds of x-ray plates we use.

TABLE I.

TIME EXPOSURES FOR FINE FOCUS COOLIDGE TUBE.

Thickness of part in cm.	Paragon plate.	Seed plate.	Cramer plate.	Intensifying screen.
1.....	1/4.....	1/3	1/2	
2.....	1/3.....	1/2	5/8	
3.....	1/2.....	7/12.....	3/4	
4.....	2/3.....	3/4	1	
5.....	1	1-1/4	1-1/2	
6.....	1-1/4.....	1-3/4	2-1/4	
7.....	1-1/2.....	2-1/4	3	
8.....	2-1/4.....	3	4	
9.....	3	3-1/2	5	
10.....	4	5	6	1-1/2
11.....	5-1/2.....	6-1/2	7-1/2.....	1-3/4
12.....	7	8	8-1/2.....	2-1/4
13.....	8	9	9-1/2.....	2-3/4
14.....	9	10	11	3-1/4
15.....	10	11	12-1/2.....	4
16.....	11	12	14	4-1/2
17.....	12	13-1/2	15	5
18.....	13	15	16	5-1/2
19.....	14	16-1/2	17-1/2.....	6
20.....	15	18	19	6-1/2
21.....	16	19-1/2	20-1/2.....	7
22.....	17	21	22	7-1/2
23.....	18	22	23-1/2.....	8
24.....	19	23-1/2	25	8-1/2
25.....	20	25	26	9

HEAD.

Lateral	12 to 15 seconds
Anteroposterior	18 to 22 seconds

It is apparent that the foregoing technic is not adapted to gastrointestinal or chest radiography, nor to the skiagraphing of infants or unruly children. For this purpose we recommend the following broad-focus Coolidge tube technic:

As pointed out earlier in this paper, a roentgen ray spectrum, varying within certain well-defined limits, is required to yield radiograms having sharpness and definition. It is, therefore, essential to know how to produce this spectrum with a broad-focus Coolidge tube.

This we determined as follows: If it requires 20 to 21 milliamperes current delivered at the tube terminals at a voltage of 60,000 to produce that desirable spectrum in a tube having a focal spot 3 mm. in diameter, then it will require approximately three times as many milliamperes in a tube of similar construction having a focal spot 9 to 10 mm. in diameter. Since the broad-focus Coolidge tube has a focal spot about 10 mm. in diameter, it will, therefore, require a minimum of 65 to 68 milliamperes current at a voltage

of 60,000 to give us that desirable spectrum. From a practical standpoint this works out precisely true.

For chest radiography the tube is energized with 90 to 100 milliamperes current when the filament is heated to back up a spark of $5\frac{1}{4}$ to $5\frac{3}{4}$ inches. The focal distance used is 30 inches, or 75 centimeters. Exposures range from $\frac{1}{2}$ to 1 second, depending on the size and weight of the patient.

For gastrointestinal work the tube is energized with 90 to 100 milliamperes current when the filament is heated to back up a spark of 6 to $6\frac{1}{4}$ inches. The focal distance used is 24 inches. This is not a sufficient distance to yield the best radiograms of heavy subjects, but has been adopted to prolong the life of our tube, since it produces very satisfactory plates. Exposures range from $\frac{1}{2}$ to $1\frac{1}{8}$ seconds, depending on the weight and thickness of the patient.

Intensifying screens are not used and have been discarded from our laboratory. For general radiography, as applied to infants and young children, the same technic used for gastrointestinal work is highly satisfactory, with the modification that the focal distance is increased to 30 inches, or 75 cm. The following table gives the approximate exposure time for different parts of the body:

TABLE II.

TIME EXPOSURES FOR BROAD-FOCUS COOLIDGE TUBE—FOR INFANTS AND CHILDREN ONLY.

Ankle.....	Lateral	$\frac{1}{6}$ second
Ankle.....	Anteroposterior	$\frac{1}{4}$ second
Elbow.....	Lateral	$\frac{1}{8}$ second
Elbow.....	Anteroposterior	$\frac{1}{6}$ second
Hand.....	.....	$\frac{1}{15}$ second
Hip.....	.....	$\frac{1}{2}$ second
Knee.....	Lateral	$\frac{1}{4}$ second
Knee.....	Anteroposterior	$\frac{1}{3}$ second
Shoulder.....	.....	$\frac{5}{12}$ second
Toes.....	.....	$\frac{1}{15}$ second
Wrist.....	Anteroposterior	$\frac{1}{8}$ second
Wrist.....	Lateral	$\frac{1}{6}$ second

It might be added that for kidney work we generally use our bone technic in conjunction with compression with a lufa sponge. The focal distance varies from 24 to 28 inches. The exposure, which is made during deep inspiration, ranges from 7 to 15 seconds, depending on the size and thickness of the patient.

If the broad-focus tube is used, the procedure is the same as the foregoing, with the difference that the gastrointestinal technic is used. Exposures range from $\frac{1}{2}$ to 1 second. The soft tissue detail is not so good as in radiograms made with the fine-focus tube, but, on the whole, is very satisfactory.

As regards filtration, we have this to say: If the focal distance is increased to a maximum, then there are a minimum number of

deflected wave undulations, and a maximum number of parallel rays for each area of tissue traversed; hence filtration is not indicated. Since, however, every x-ray tube sends out varying proportions of secondary rays arising from the walls and kathode neck, we have found that a filter of 5 mm. of sole leather, placed at the proximal end of the diaphragm, improves both bone and soft tissue detail of thin parts, such as elbows, knees, and ankles. For heavy, thick parts we cannot see that it has any particular value.

In conclusion, it scarcely need be urged that this technic places radiography on a more scientific basis than any other method we know of now in use. From a practical standpoint it yields plates of very high quality and insures great uniformity of work. These are requisites which are as absolutely necessary for accurate roentgenological diagnosis as properly stained and well-mounted sections are essential to correct diagnoses by the pathologist.

PRACTICAL METHODS IN OPHTHALMIC EMERGENCIES.

By DR. JOHN GREEN, JR., St. Louis.

Confronted with an ocular disease or injury, the practitioner will usually prefer to get the patient into the hands of the oculist at the earliest possible moment. Many physicians frankly admit that "they know nothing about eyes," and will not, if they can avoid it, assume the responsibility of treatment in ocular affections or injuries. Such physicians are honest with themselves and with their patients, for it cannot be gainsaid that *very prompt* attention on the part of a skilled ophthalmic surgeon will in many cases be the means of saving injured and diseased eyes which, lacking such care, would be lost. But "circumstances alter cases," and the practitioner, with the best intentions, may find himself compelled to render at least emergency treatment. This is true of the "Company doctor," who, in addition to treating mashed fingers, lacerations, burns, and fractures, is expected to be able to repair damaged eyes. At least the company may expect him to do so, although some of the insurance companies, particularly in states which have workmen's compensation laws, find it greatly to their advantage to have as many injured eyes as possible restored to usefulness and sight, and hence insist that all workmen sustaining eye injuries, however trivial, shall be referred immediately to an oculist.

The practitioner in the country must be an "all-round man" if he is to serve his community effectively. He cannot "pick and choose" like his city brother, but must take what comes to him and do his best. He may be disinclined to practice ophthalmology, but again and again he is compelled to do so. The patient with an acutely inflamed and painful eye demands immediate relief, and the victim of an ocular injury insists that something shall be done "at once."

This paper aims to offer some practical suggestions to the practitioner in the handling of ophthalmic emergencies. "What not to do" will be considered as well as "what to do." Very often the best policy is to do little or nothing, pending consultation with the ophthalmologist. Ill-considered medication or meddlesome surgery—for the sake of doing something—often renders the after-care much more difficult.

In a brief discussion it is better to be didactic, and hence I shall confine myself to a consideration of methods which have proved their worth in my own hands, granting, at the outset, that other methods may be of equal value.

FOREIGN BODY ON THE CORNEA.

Determine the presence of the foreign body, using focal illumination and a magnifying glass (watchmaker's loupe is good, as it leaves both hands free; a binocular loupe is still better). Very minute bodies may easily escape detection unless the light is projected from different directions, or the patient is made to rotate his eye. Having determined the location of the foreign body, note whether it is surrounded by a delicate grey or yellowish ring (beginning infection). After 3 percent cocaine hydrochlorate, or 1 percent holocain hydrochlorate (instilled three times at two-minute intervals), stand behind the patient, have him rest his head upon your chest or upon the back of the chair; separate the lids with the fore and middle fingers of the left hand, instruct him to *keep both eyes open* (the tendency is either to close both or to roll them upward) and to look at an object which you will designate. It may be necessary, in order to bring the foreign body perfectly into view, to have him shift his gaze a little to the right or left, or up or down. It is much easier for the patient to obey an instruction, "look at the window-fastener," or "look at the sash," than to look "a little" to the right or left. Definite fixation of an object also insures a much steadier globe for the operator's manipulations. The foreign body spud (my own preference is for Wheeler's corneal curette) is insinuated beneath the foreign body, which, by the gentlest manipulation, strictly confined to the site of lodgment, is lifted out. A careful search should then be made to see whether there is any unremoved particle; often, in the case of cinders or emery particles, the bed of the foreign body contains a brown ring of charred tissue. It is very essential that this also should be gently curetted out. To define exactly the area denuded, a single drop of a 2 percent solution of fluorescein (potassic fluoresceide) is instilled, and the patient instructed to close his eyes for a few moments. The excess solution is flushed out with 2-percent boric solution. It will be found that the corneal area denuded of epithelium is stained brilliantly green, the rest of the cornea and conjunctiva showing no discoloration. A toothpick, or match sharpened to a fine point, is dipped in tincture of iodine, the excess gotten rid of by gently shaking the pick, as one would shake a clinical thermometer, and the iodine-soaked end brought into contact with the denuded area. In a case suspected of beginning infection apply (in the same manner) pure carbolic acid. As an applicator, a toothpick is much superior to a metal probe, for the reason that the wood fiber absorbs the solution and the minutest quantity (a small fraction of a drop) can be applied with precision directly to the area; there is no tendency to spread beyond the point intended. The eye is then flushed out with 2-percent boric solution. A small quantity of White's ointment (bichloride vaseline, 1/3,000) is inserted

in the conjunctival sac and the eye sealed with an "occlusive dressing." By an "occlusive dressing" I mean one that will effectively debar the inquisitive fingers of the patient from gaining access to his eye. The dressing that I use is made as follows: a round of cotton, 2 inches in diameter, is dipped in bichloride (1/3,000) and wrung dry; this is placed over the closed lids and patted down to conform to the contour of the lids; a small ball of dry cotton is placed over this, and the whole held in place by a round of gauze, which is pasted to the forehead, temple, cheek, and nose by flexible collodion.

Everyone's tendency is to finger a body wrapping, and especially an eye bandage. Recipients of foreign bodies in the eye often return to their foundries or factories to report, and there the surroundings are anything but clean. The amount of grime that an eye dressing may acquire superficially in twenty-four hours is often surprising, but it is certainly comforting to feel assured that, so long as the ring of collodion holds intact, there is no chance for extraneous dirt or infection to find its way into the eye. If the fluorescein staining reaction is present at the first dressing, the occlusive dressing is reapplied for another twenty-four hours.

To recapitulate, the steps to be followed are: (1) cocainization, (2) clean removal of the foreign body, (3) topical application of tincture of iodine or pure carbolic acid, (4) insertion of bichloride ointment into the conjunctival sac, (5) occlusive dressing. This routine will effectively guard against extraneous infection and recurrent corneal erosion, which sometimes follow the open method of treatment—i. e., without a bandage.

One possible source of infection should be borne in mind—e. g., a chronically infected lacrimal sac. Some of these sacs are painless, and give their possessors little concern save for the overflow of tears. An eye adjoining such a sac is always in peril; a corneal abrasion usually becomes infected, and then we have the picture of the so-called "serpent ulcer," which may lead to perforation and complete destruction of the eye. In the presence of this complicating factor, ophthalmic consultation should be promptly secured. In the meantime the eye should be left open, and, as a prophylactic measure, should receive every hour 10 drops of a 1-percent or 2-percent solution of ethylhydrocuprein hydrochlorate (now unhappily unobtainable on account of the war), which has a specific action on the pneumococcus, the organism usually responsible for chronic inflammation of the sac.

FOREIGN BODY IN THE CONJUNCTIVA.

If careful search fails to reveal a foreign body on the cornea, it may be found lodged on the tarsal surface of the upper lid, whence it can be readily removed, or it may be found lurking in the folds

of the upper or lower cul-de-sac. In the country, people often get beards of wheat or wing cases of insects into their eyes; such objects are very apt to get hidden behind folds of edematous conjunctiva and escape observation to all but the most careful search. After cocainization a cotton-wound toothpick moistened in a boric acid solution is gently inserted into the upper fornix (the upper lid having been everted) and drawn gently toward the nose or temple. Frequently the foreign body will be found clinging to the meshes of the cotton. An even more effective exploration may be attained by grasping the everted lid at the tarsal edge with a pair of fixation forceps and drawing the edge forward and upward. In this way the retrotarsal folds are brought into view and can be minutely examined. Exploration of the lower fornix is obviously much easier; the same maneuver with the cotton-wound toothpick will, however, often prove useful. A foreign body that has lodged for any length of time in the conjunctival sac may, through the action of the lids, have been brought into contact with the cornea and abraded it. Such an abrasion will often be revealed by focal illumination, and will always come to light when stained with fluorescein. Always a certain degree of traumatic conjunctivitis follows the retention of a foreign body in the sac, and it is wiser to allow free drainage of the secretion than to pen it up behind a bandage. This is true even in cases complicated by corneal abrasion. The patient should be instructed to flush out the eye with 2-percent boric acid, or the like, and anoint the lid margins with vaseline at night. Protection may be afforded by London smoke coquilles or an eye patch. The eye should be inspected the next day.

CONTUSION INJURIES.

The commonest result of a blow on the eye from a blunt object (stick, ball, fist, etc.) is a rupture of an iris vessel, with hemorrhage into the anterior chamber. This accident, though greatly alarming to the patient (as vision is temporarily almost completely abolished), may result in no permanent damage. If complicated by a tear at the ciliary border (iridodialysis), dislocation of the lens, or permanent paralysis of the pupillary sphincter, the outcome is less satisfactory. There is also a possibility of rupture of the choroid or even of a tear of the sclerotic. The prompt and repeated instillation of 1-percent atropin sulphate, once an hour, to secure as much dilatation of the pupil as possible, the use of 3-percent to 5-percent solution of dionin, three times daily, and hot, moist compresses to promote absorption, together with the administration of a hydragogue cathartic, is the proper emergency treatment.

PENETRATING WOUNDS.

By a "penetrating" wound is understood one in which the interior of the eye has been invaded by some foreign object. These

wounds may be roughly divided into (1) those in which the foreign body has been wholly withdrawn from the eye, and (2) those in which the foreign body has remained within the eye-ball. A penetrating wound of either class is always a serious affair. These eyes may already be infected through the conveyance of infective material into the eye by the foreign body. If not infected at the time of injury, they are in danger of becoming infected from septic material in the conjunctival sac. So it behooves the practitioner to handle these cases with the most scrupulous attention to asepsis. Before touching such an eye he should prepare his hands as though he were going to perform a major operation. Manipulation of the lids should be gentle. It is advisable to instill a 3-percent solution of sterile cocain hydrochlorate, several times (this will diminish the superficial sensitiveness and enable a better exploration to be made). The conjunctival sac may be gently douched with a sterile saline or weak bichloride solution (1/6,000), and a drop of 1-percent sterile atropin solution instilled. The inspection will enable the physician to determine the nature, site, and extent of the wound; whether the lens has been injured (shown by cloudiness) and whether there is prolapse of vitreous or iris. As a rule, manipulation should not proceed farther. The eyelids should be covered with a dry sterile pad, a bandage applied, and the patient at once transferred to the care of an oculist. If the iris is prolapsed through a corneal wound, it is debatable whether an immediate iridectomy should be performed. Generally not, certainly not, if an oculist's services can be secured within twenty-four hours.

When a small fragment of steel or other material has entered the eye, it may be possible to detect the point of entrance and, what is just as likely, it may be quite impossible. The assumption, therefore, that, because one cannot detect the point of entrance, there can be no foreign body in the eye is unjustifiable.

GUNSHOT WOUNDS.

Hunting accidents in which one or both eyes are damaged are likely to be seen first by the practitioner. Often the face and lids contain several shot in addition to the one or more that may have entered the eye. The treatment outlined for penetrating wounds is applicable also to this type of injury. Relatively few eyes thus injured become septic, and, while vision is apt to be lost, it is often possible to retain the eyeball. It is highly important to secure an idea of the vision in both the injured and uninjured eye. This is desirable both from the standpoint of the completeness of the record and as a protection to the practitioner. This knowledge, too, may be of value later in the event of a claim for damages. I recall the case of a man whom I treated several years ago for a gunshot wound of the left eye. He was seen a few hours after the accident, when

it was found that the vision of the right (uninjured) eye was only one-tenth of normal. Inquiry elicited the fact that the right eye had squinted in youth, that it had been neglected, and its sight had gradually failed. Failure to have secured this data at the first examination would have prevented me from making a good defense in the event the patient subsequently claimed that my treatment of the injured eye had impaired the vision of the other.

WOUNDS OF THE EYELIDS.

The eyelids may be lacerated in a variety of ways—usually the tear is vertical. It is important to ascertain whether the upper or lower canaliculus has been cut through; in this case a careful search must be made for the nasal end of the divided canaliculus. If found, a sharp-pointed bistoury is passed through this opening as far as the sac and the remnant of the tube freely slit. This little operation is by no means easy, but should always be attempted, for the nasal end will close permanently within a few hours and drainage of the tears will be seriously interfered with. Suture of the divided ends will not restore the lumen of the canal. Lid wounds which involve the margin should be sutured with silk as soon as possible after injury, exercising particular care that the margins are exactly approximated. If swelling incident to the trauma has already occurred, it is useless to attempt a repair. Under these circumstances the best one can do is to wait until all acute symptoms have subsided and then repair the lid secondarily. If there is any suspicion of contamination with dirt, a prophylactic injection of tetanus antitoxin is indicated.

INJURIES WITH ACIDS (SULPHURIC, NITRIC, ETC.)

Usually the victim has already had his eyes washed out with water before you arrive. Nevertheless they should be copiously irrigated with sterile water or normal saline to minimize as much as possible the cauterizing effect of the acid. Or a weak bicarbonate of soda solution may be used. Instill olive or castor oil freely. Locally instill 2-percent cocain hydrochlorate, or 1-percent holocain hydrochlorate. Morphia may be necessary to control pain.

INJURIES WITH ALKALIES (CONCENTRATED LYE, LIME, ETC.).

These are desperate cases, and demand quick action if anything is going to minimize the fearfully destructive action of these caustics. The lids should be forcibly held apart and doused with water; for the sake of quick action, the eye may be held open under a faucet. This should be followed by a weak acid solution (say, 1 ounce of vinegar to 1 pint of warm water), and then olive oil and the oculist!

OPHTHALMIA NEONATORUM.

Many new-born babies have sore eyes; many of these infections are mild. Some that begin, clinically, in a very mild way may become very dangerous. It is the part of wisdom to regard every sore-eyed infant as a possible candidate for the blind school. *Vigorous, intensive, and continuous* treatment for one, two, or three weeks (as long as the discharge continues) will not damage eyes with mild and will save those with severe (gonococcal, etc.) infections. The responsibility of the practitioner is very great. May he exert himself to the utmost to see that no more babies become needlessly blind!

The emergency may properly be met by the following routine: (1) irrigate the conjunctival sacs with a gentle stream of warm saline solution, separating the lids so that all parts of the sac are freed from pus; (2) instill 1-percent silver nitrate, washing away the excess with saline solution; (3) order attendants to instill 25-percent argyrol every hour, and to separate the lids and clean away the pus as well as possible (all of which is exceedingly difficult to accomplish effectively outside of a hospital); (4) order cold applications (small pads of cotton chilled by being pressed against a block of ice) for ten minutes three times a day; (5) secure the co-operation of an oculist at once.

It should be borne in mind that a very acute conjunctivitis in an adult may be due to a gonococcus infection. It is a very simple matter for the practitioner to examine a stained smear of the pus to prove (or disprove) this possibility. Should the smear show intracellular biscuit shaped diplococci, no time should be lost in securing ophthalmic advice. Should the disease be unilateral, the uninvolved eye should be protected by a watch-glass held in place by adhesive.

ENTROPION.

The victims of chronic trachoma suffer from cicatricial alteration of the tarsal cartilage, whereby the eyelashes are turned toward the globe and rub against the cornea. Most of these sufferers have provided themselves with tweezers, and, when the scratching becomes intolerable, search for the offending lash and "yank her out." This maneuver gives only temporary relief, as the root is not destroyed, the lash soon grows again, and the process has to be repeated. If the practitioner is requested to help in this epilation, he ought to decline and inform the patient that the only effective cure is by operation. Temporary relief may often be afforded by painting a narrow horizontal strip of contractile collodion parallel to and a few millimeters from the lid margin. If it is possible to plaster down most of the lashes, so much the better.

If the lower lid is involved, the same purpose will be served by

employing adhesive tape; three 1½-inch strips are affixed to the lid as near as possible to the ciliary margin. Downward traction will then slightly evert the lid, which may be held in this position by affixing the lower end of the strips to the cheek.

INFANTILE DACRIOCYSTITIS.

It is surprising how often the diagnosis of this fairly common trouble is missed. The "pussey-eyed baby" is known to every practitioner—the "weepy" eye that won't get well. Often it is regarded as a "cold" in the eye, but through some perversity of Providence it is not like other colds—it shows no improvement after a course of argyrol and boric acid. The true nature of the trouble will be revealed by pressure over the site of the sac, which will cause a flow of mucopus through the canaliculi to the conjunctival sac. Instruct the mother to make pressure over the sac several times a day, cleansing away the expressed material with 2-percent boric acid. If, after a few weeks of this treatment, there is no improvement (which is usually the case), the oculist's aid should be invoked. The passage of a small probe will restore the patency of the bony duct which has been closed by fetal debris. Normal drainage is re-established, and usually the trouble is at an end.

LACRIMAL ABSCESS.

A chronic dacriocystitis in an adult may at any time develop into a lacrimal abscess, the evidences of which are too obvious to require comment. The practitioner will rarely see such a case in its earlier stages, when measures to reestablish drainage through the duct might be available. Usually it will be necessary to make a fairly deep, though rather short, incision over the most prominent part of the swelling. Pain is often intense, and for this reason incision may be necessary before the abscess has pointed. The incision may be rendered quite painless by freezing the area with ethyl-chloride. The after-care of these cases should invariably be in the hands of the oculist, who will endeavor to secure drainage into the nose either through the natural passage or by creating an artificial opening into the nose (West's operation). Unless nasal drainage is reestablished, there is serious danger of the establishment of a lacrimal fistula. Finally it may become necessary to extirpate the sac.

IRITIS AND GLAUCOMA.

The onset of acute pain, with diminishing vision, associated with congestion of the eyeball, usually betokens an attack either of iritis or acute glaucoma. It is manifestly of the highest importance to establish a differential diagnosis, as the treatment for iritis—atropine—is absolutely contraindicated in glaucoma.

Acute glaucoma presents a steamy cornea, shallow anterior chamber, pupil semidilated and reactionless, and greatly increased tension. Acute iritis shows, as a rule, ciliary congestion, pain on pressure over the ciliary region, a clear cornea, a fairly deep anterior chamber, a contracted pupil, and normal or only slightly increased tension. If the practitioner is sufficiently confident of his diagnostic skill to determine that in a given case he is dealing with an iritis, he should have no hesitancy in prescribing atropia. For the unquestioned case of glaucoma the proper treatment is repeated instillations of 1-percent pilocarpin muriate, with two or three drops in the day of $\frac{1}{4}$ -percent physostygmmin sulphate. But if there is the shadow of a doubt, he should avoid the use of atropia. Better to use pilocarpin and physostigmine in an eye with iritis than to use atropin in an eye with glaucoma. Probably the best policy to pursue is to avoid all local medication until through consultation with the oculist the diagnosis has been cleared up.

Iritis dependent on syphilis often presents conspicuous gummatous enlargements at or near the pupillary margin. These cases run a very violent course, and demand, in addition to local treatment, the prompt intravenous injection of salvarsan. It is very surprising to observe the twenty-four-hour transformation of such an iritis into a relatively mild affair.

SUDDEN FAILURE OF SIGHT.

Sudden failure of vision without external inflammatory signs may betoken the appearance of choked disc due to intracranial lesion. It should be borne in mind, however, that a high degree of choked disc is compatible with perfect sight. Not rarely a suppuration or even a low grade of inflammation in the posterior ethmoidal and sphenoidal cells may give rise to unilateral or bilateral optic neuritis. Prompt operative intervention on the part of the rhinologist may then be the only means of saving sight. These intraocular conditions can be only suspected, unless one is able to examine the eye-grounds with the ophthalmoscope. But even in the absence of such skill, the possibility of intracranial disease and accessory sinus suppuration should be considered in seeking an explanation for sudden loss of vision in one or both eyes.

THE CROSS-EYED CHILD.

Advice as to the cross-eyed child is occasionally sought. It is regrettable that there is still a prevailing notion that little can be done other than operation, and the advice usually given tends to delay the time when the little patient comes under the care of the oculist. It is proper in these cases to urge examination *immediately*, no matter how young the child. Delay only means that the squinting eye becomes more and more blind, and finally may reach a state where all the efforts of the oculist to restore it to parallelism and vision (by appropriate lenses and training) may be in vain.

Metropolitan Building.

COMPLETE REMOVAL OF CANCER OF THE UTERUS BY THE CURETTE.

By PALMER FINDLEY, M. D., Omaha, Neb.

A comprehensive and convincing article by Louis J. Ladinski on "Complete Removal of Adenocarcinoma of the Uterus by Exploratory Curettage" appeared in *Surgery, Gynecology, and Obstetrics*, March, 1915. Since the publication of this article two cases in point have come under my observation. They are briefly as follows:

CASE I.

Mrs. B., aged 44; entered the Stewart Maternity Hospital of Omaha, December 2, 1916. She was then seven and a half months pregnant, and was suffering from an acute parenchymatous nephritis, with all the usual attending toxemic symptoms. Failing to ameliorate the symptoms with the usual tentative measures, I interrupted pregnancy by introducing a hydrostatic bag. Upon dilating the cervix, a polyp presented at the external os and was excised at its base. This polyp presented the characteristic microscopic appearance of an adenocarcinoma. Three weeks later I removed the uterus and was unable to detect any evidence of malignancy by the naked eye. The uterus was thoroughly sectioned and no microscopic evidence of malignant invasion could be found. Furthermore, there was no evidence of invasion of the parametrium or pelvic lymph nodes.

CASE II.

Mrs. X., aged 56; 2-para; had experienced an excessive loss of blood at various intervals for six months. An exploratory curettage and microscopic examinations of the scrapings revealed a polyp with typical adenocarcinomatous changes. The curettement was shortly followed by hysterectomy. There was no macroscopic evidence of malignancy, and extensive sections made of the uterus disclosed no malignant invasion.

Neither of the above cases permits of reasonable doubt as to the diagnosis of cancer from the scrapings, and of the absence of cancer in the subsequently removed uteri. I say this without fear of contradiction because of the extreme thoroughness with which the sections were examined by several competent pathologists. In each case the scrapings were typical of well-advanced adenocarcinoma, and the removed uteri were sectioned and examined systematically throughout.

We are indebted to Paul Rüge for pioneer work on uterine scrapings, and to Martin for possibly the first suggestion of the accidental and complete removal of cancer from the body of the uterus by the curette. Martin's case did not pass muster before the Gynecological Society of Berlin, but ten years later (1896) Gessner reported two similar cases which were universally accepted.

The accompanying bibliography gives evidence of the meager number of cases recorded, but, because of the deplorable fact that the majority of operators do not make systematic examinations of all scrapings from the uterus, we are not to infer that the scarcity of case reports suggests in any measure the actual number of cases passing through the hands of surgeons unobserved. Furthermore, it is not to be inferred that cancer is wholly eradicated by the curette when the removed uterus contains no evidence of cancer cells. Ruge diagnosed cancer from the scrapings; later he removed the uterus and could find no evidence of cancer in the walls of the uterus; yet within six months his patient died from cancer of the liver.

Three cases reported by Ladinski, one by Boldt, and the two here reported are the only case records in American literature, so far as I am able to find. It is fair to assume that the failure to make systematic routine examinations of scrapings accounts for the scarcity of these case records.

Vassmer and Hess each curetted the uterus and diagnosed cancer from the scrapings, but were unable to find any malignant infiltration in the removed uterus; yet within four years both of these cases showed recurrence, and were followed by death, thus adding still further evidence to that of Ruge to the effect that the prognosis must always be guarded in such cases. Three cases in the literature are reported as permanently cured by the curette. The question naturally arises, should the curette ever be relied on to obtain a cure of cancer of the body of the uterus? The answer is unequivocally, No!

I have added my two case reports to those that have preceded merely to support the evidence that such happenings do occur, and possibly with no little frequency, but I would not for a moment give the impression that the curette can be relied on for a cure of cancer of the uterus. The finding of cancer in the scrapings calls for early extirpation of the uterus, and a guarded prognosis must be given even in the absence of infiltrating epithelial cells in the removed uterus. It would indeed be deplorable if the curette were relied on to effect a cure.

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RADIOTHERAPY IN SCIATICA—A CASUISTIC CONTRIBUTION.

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In the chronic forms of sciatica the ordinary means of treatment frequently fail to secure relief and cure of the distressing symptoms. Although the necessity of including physical means in the treatment of this disease is doubted by some authorities (Osler¹), others are in favor of such therapeutic agents (Strümpel,² Mehring,³ Anders,⁴ S. Monell,⁵ Bennett⁶). Since radium has become a valuable agent for the relief of morbid conditions, chronic sciatica has been accepted among the indications for radiotherapy (Zueblin⁷).

The following cases, observed partly at the University of Maryland Hospital and partly in private practise, were treated with radioactive energy, and present some practical interest.

CASE I.

A. A. H., Breckhill, aged 63, laborer, gardener, admitted December 1, 1914, Ward G, No. 11, white, living separate from his wife for the past ten years. *Complaint.*—Pain in left hip. *Family history.*—Father died of hemiplegia at age of 75. Mother died from scarlet fever when 25 years old. One sister died at the age of 3; one sister living and well. Patient's wife had no children; no report of miscarriages; history negative to tuberculosis, malignancy, or other diseases. *Personal history.*—Scarlet fever at age of 9, uncomplicated; mumps at age of 30, complicated by orchitis; measles at age of 40. Otherwise negative history also as to venereal infection. *Habits.*—Used to consume a great deal of coffee; takes none at present. *Exposure.*—As a gardener he was exposed to all fluctuations of weather while doing hard work.

Present illness.—During the past nine years patient suffers from exasperating acute pain in the left hip joint, so that he is, at times, unable to walk; cool, rainy, or damp weather increased these manifestations. Treated for an attack by his physician, who gave him oil of wintergreen; patient was told that he suffered from rheumatism. Three to five months later the pain shifted to the left lumbar region of the spine; any slight traumatism, such as riding on the car, was followed by more accentuated pains in his left lumbar region, but not in his left leg. Treated for a long time at another institution of the city by electricity; the pains became more pronounced in his left hip joint. Having tried all kinds of treatments without any relief whatsoever, patient was referred to the hospital. Sometimes after a heavy effort and strain patient felt something slip or click in the hip joint, which sensation was followed by an acute pain, which, for some relief, required absolute rest. Unable to work for the past six months, patient had experienced much suffering even while continuously at rest. Walking was only possible when using crutches, though this did not ease the pain materially. From the hip the pains radiated down-

ward to the middle of the leg, around the knee and to the calves. According to patient's observation, compression of the nerve or a tight bandage were the best means to get relief. *Gastrointestinal tract.*—Negative, except marked constipation. *Pulmonary system.*—At the present time patient has a slight cold, a mild cough, but no sputum or pains in his chest, or change of voice. His weight has remained almost the same, with perhaps a slight increase within the past few years. *Circulatory and genitourinary systems* negative in every respect. *Nervous system.*—Negative, except for symptoms already mentioned.

Patient is deaf in his right ear since having had scarlet fever at age of 9. For the relief of his pains, patient wears a belt around the pelvis, which helps him considerably.

Physical examination.—Patient well developed, well nourished; in dorsal position, apparently not suffering from pain. *Head.*—Nothing abnormal, except his deafness. Eyes normal. *Mouth and throat.*—False teeth in the upper jaw, slight pyorrhea of lower teeth noted. Slight fine tremor of tongue, congestion of the pillars and the posterior pharyngeal wall. *Neck.*—Old scar in the submaxillary groove dating from scarlet fever. Moderate enlargement of the anterior cervical glands. *Chest.*—Fairly well developed, respiratory movements equal, slightly impaired percussion sound over right apex in front, diminished percussion over both bases posteriorly. Breath sounds harsh, granular, prolonged expiration over both apices, slight tendency to tubular breathing over right apex at back; toward bases breath sounds become indistinct and distant, with a few rales heard over right base. Vocal resonance increased over entire chest posteriorly, but mostly over right apex. *Heart.*—Apex in left fifth intercostal space cardiac dullness extending to third rib above and one-fourth inch to the right from the costal margin in fourth interspace; over apex roughened first sound, snappy second, but no murmurs; second pulmonary and second aortic are snappy, accentuated, but without murmurs. *Abdomen.*—Liver, spleen, and intestines normal in size and position; no hernia; no muscular spasm. *Genitals.*—Negative. *Back and extremities.*—A small scar observed in anterior region of right thigh attributed by patient to an abscess. No other evidence of past inflammatory processes. Both hip joints, knees, and ankles are fairly movable. Patient complains of pains in his pelvis, particularly on elevation and flexion of the left thigh. At the same time tenderness and pain is elicited in the left sacroiliac joint on superficial and deep palpation. On the posterior surface of the thigh there is a zone of hyperemia due, according to patient, to an injection. Reflexes of the right lower extremities are exaggerated, on the left side they are hardly perceptible. By closer investigation there is found along the left lumbar region, descending from the fourth and fifth transverse process and over the left sacroiliac region, considerable pain on deep pressure. The x-ray shows a proliferative process and rarification of the osseous structures.

Laboratory findings.—Urine: specific gravity, 1,020; no sugar or albumen; in the sediment many calcium oxalate crystals, few mucous shreds, and white blood cells. Blood count on March 12, 1914: hemoglobin, 90 percent; leukocytes, 8,220; polynuclear, 59 percent; small lymphocytes, 32 percent; large lymphocytes, 3 percent; transitionals, 1 percent; basophiles, 1 percent; eosinophiles, 4 percent. Blood pressure: 125 systolic, 90 diastolic.

Treatment.—Patient was kept in bed, with a soft diet; chloral hydrate (15 grains) was given without much relief to the patient. In the morning of December 2 radioradium was applied to the sacroiliac region, 270,000 M. U. The patient felt immediate relief, and stated that he had not felt as comfortable for the past six months. Similar applications were made for an equal length of time on December 3 and 4, each being followed by considerable relief to the patient. From December 6 to 9 the application was increased each day to

450,000 M. U.; as long as the application was repeated every day the patient felt considerably improved. *Spontaneous and elicited tenderness over the left sacroiliac joint, and the left sciatic were hardly noticeable.* Occasionally, immediately after the application, the patient had some burning and itching sensation; according to patient's statement he is convinced that *without the radium application he never would have improved* as rapidly as he did. On December 10 and 11, 270,000 M. U. were applied with the same result. No internal medication was given at all, except some castor oil on the 10th (1 ounce) and magnesium sulphate (1 ounce) on the 8th. The patient, who had previously been restless and sleepless, during the radium application enjoyed thorough rest and sleep.

Since the x-ray examination had shown a deformative process, the patient was advised to have a cast made for the immobilization of his affected joint, which suggestion did not receive the patient's consent, and therefore he left the hospital considerably improved, but anatomically not cured.

CASE II.

D. D., physician, aged about 40, suffered for several years from sciatica in his left leg. Patient complains of a tingling sensation and distinct pain in his left thigh. Has tried all kinds of medications, such as aspirin, salicylates, static electricity, galvanism, four-cell baths, hot air, electric light, homoeopathic medications, without any lasting relief.

General condition.—Patient comes for a consultation. His diet is mixed, consisting of a moderate amount of meat every day; no alcohol, coffee, tea, or tobacco. No digestive disturbances, except occasional belching and occasional constipation, followed by diarrhea. Patient voids $2\frac{1}{2}$ pints of urine daily. Genitourinary system normal. General health is excellent. Heart and chest examination, abdominal palpation give negative results. *Local condition.*—Left leg is slightly shorter than the right; there is distinct tenderness along the sciatic nerve from the point of emergence to the middle of the leg. Examination of the spine does not reveal anything particular. Urine is acid, contains a trace of albumen and globulin, no casts, no sugar, no indican.

Treatment.—Thorium application for three hours every day (270,000 M. U.) Patient reports immediate improvement after the application of mesothorium, and now he is able to use his left limb more extensively without difficulty. The patient continues the applications for about six days and then stops them entirely. The immediate improvement seemed to last for several days after the application was stopped, but two weeks later the patient ascribes the final relief and cure to osteopathic treatment, to which he resorted on the advice of friends. The patient was lost sight of. Apparently the mesothorium application resulted in temporary relief. To what extent the osteopathic treatment was justified escapes our appreciation.

CASE III.

F. N., Ward G, No. 5, aged 23, sailor, single, from Norway. Admitted September 8, 1914, discharged October 13, 1914. *Complaint.*—Pain in lumbar region. No history can be obtained on account of the patient's inability to understand English.

Present illness.—Is characterized by lancinating pains from the left flank downward to hip, with transverse radiation to the front of the abdomen and extending into the left lower extremity, more pronounced during the night and during motion. The radiation of pain does not extend toward the bladder and the external genitals; there was never any blood noticed in the urine or the presence of concretions.

Alimentary tract.—Negative. *Pulmonary system.*—Occasional cough, no other suspicious signs. *Circulatory system.*—After standing on his feet for a long time, moderate edema of the ankles results, occasionally palpitation of the heart and pains in the cardiac region after exertion. *Urinary, locomotor, and nervous symptoms.*—Are absent, except occasional attacks of frontal headache of a dull, aching character. Syphilitic and gonorrheal infections are denied. *Physical examination.*—The organs of sense and the head normal, except marked pyorrhea, poor preservation of teeth, coated tongue. Enlarged cervical glands on either side, not tender and movable. *Chest.*—Slightly increased tactile fremitus over left apex, numerous mucous rales over both bases posteriorly. *Heart.*—Normal; pulse, 85. *Temperature*, 99 1/5; *respiration*, 25. At no time was any rise of temperature observed; the pulse in the course of the disease became regular, rating 60-70, respiration became normal (20). *Abdomen.*—Soft, no tenderness, no abnormal masses found. In lumbar region on either side of the vertebral column a zone of tenderness on superficial and deep pressure is elicited on contraction of the lumbar muscles. *Extremities.*—Normal. Inguinal glands enlarged, reflexes normal. On September 28, the orthopedic examination shows no scoliosis, but the lumbar curve is quite abrupt. (See later observation.)

Laboratory findings.—Urine: specific gravity, 1,012; medium ring of albumen, but no casts noticed. The same finding is obtained after massage of the prostate. September 10 and on successive days (9th to 30th) the heavy ring of albumen was still present; occasionally pus cells, but no casts. Urea, 5.76 grain; reaction of urine alkaline; specific gravity, 1,008; total amount, 980 c.c. October 13: amount, 1,920 c.c.; reaction acid; specific gravity, 1,015; medium ring of albumen; urea, 7.6 grain; pus cells, a few red blood cells, but no casts in sediment. *Sputum examination.*—Negative as to tubercle bacilli. *Blood.*—Hemoglobin, 85 percent; red blood cells, 4,600,000; leukocytes, 8,920. Wassermann reaction negative.

Treatment.—Medication consisted at first of sodium salicylate 30 grains daily; elixir of heroin and codein, 1 dram every four hours. The salicylate medication, a week later, was doubled without giving the slightest relief up to October 7, four weeks after admission. The physical examination on that date still showed a marked contraction of the lumbar muscles on the right side, tenderness on deep pressure at level of the first to second lumbar vertebrae. On the left side the muscular contraction was also present, but on deep pressure no tenderness is elicited. Patient presented marked demography. Pulse was 90, becoming accelerated to 150 per minute, hardly perceptible and intermittent during bulbus pressure. Moderate tremor of tongue was noted, thyroid gland was slightly enlarged, but not plunging behind the manubrium sterni. The left pupil was slightly larger than the right, but equal in reaction to light and accommodation. No enlargement of prostate was found. On October 8 the mesothorium was applied for twelve hours to the lumbar region, which medication, without salicylates, was followed by considerable relief. This application was continued for three more days, total strength of application was 4,320,000 M. U., giving each time marked relief. The patient, however, for special reasons could not keep up the treatment and was discharged considerably improved on October 13, five days after the radium treatment was started.

While in the three preceding cases mesothorium was applied to the tender areas, in the following two cases a mixed treatment was given, partly consisting of the direct application of radium-radiorem, with radioactive magnesium sulphate solution or ointment, to which was later added the direct use of high frequency current.

CASE IV.

This refers to a patient aged about 48, business man, who for the past four years had been suffering from recurrent attacks of sciatica, which so far had never disappeared entirely, notwithstanding the many forms of treatment tried, including medicinal and physical applications. The family and past history of the patient is negative. Patient is accustomed to a moderate use of stimulants, as tobacco, coffee, and alcohol. Physical examination reveals normal findings as to heart, lungs, digestive and urinary system.

Local condition.—Considerable tenderness at point of emergence of both sciatic nerves, extending along the posterior surface of the thighs, with irradiation toward the anterior surface of both tibiae, medium degree of atrophy of the muscles of that region. On examination the rectum was normal, also the prostate. Urine contains faint trace of albumen, occasionally a few hyaline casts, no sugar present, moderate amount of indican. Patient is stout, well nourished, no indications of tophi or arthritic changes.

At first the patient was advised to apply over night a radiorem stick,¹ wrapped up in a moist compress of water, to one sciatic nerve. The result was satisfactory as to the easing up of the almost constant pain, while the next day the physical examination showed less tenderness on pressure along the involved nerves. To the other leg the patient was ordered to apply over night a salve containing radioactivated magnesium sulphate,² which substance was spread in a thin layer on a small strip of linen. The therapeutic result was equally satisfactory—namely, disappearance of spontaneous soreness, and lessened sensibility on touch and pressure upon the sciatic nerve and its branches.

In order to increase the therapeutic effect, the patient was given five treatments of high frequency waves by an arrangement through which his legs were connected with one terminal of the Ruhmkorff apparatus, while the globe electrode emitting the corpuscular waves was applied directly along the involved sciatic nerves. This treatment was given each time for three to five minutes, with a prevailing amperage of 8 to 10 milliamperes in the primary circuit. For a very short period, a few seconds only, the current was increased as to yield sparks on the body of the patient. The result of this application was rapid and a complete disappearance of the spontaneous soreness, absence of any pressure points along the formerly involved nerves, gain in strength, and absence of tiredness even after prolonged walks, while the

¹The radiorem stick, weighing 13.62 grams, when examined under the contactoscope caused an immediate collapse of the leaflets with a test carried out for alpha and beta radiation as well. For an approximate value of the radioactivity, a small piece of the substance was powdered and with 0.013 gram examined on May 29, 1915 (test 1770). For 1 gram substance in one hour: a maximum 1 min. reading beta radiation of 26403.82 volts or 42172.18 M. U., a minimum 15 min. reading beta radiation of 5338.46 volts or 8606.45 M. U., were found. The total beta radiation for the piece of radiorem applied would correspond to a maximum of 35,962.0 volts or 574,485.09 M. U. in one hour. The minimum (13 min. reading) for beta radiation would be 73,390.8 volts or 117,219.8 M. U. An estimation of the alpha rays, as obtained from 0.013 radiorem substance tested on May 29, 1915 (test 1769) gave maximum 1 min. reading 10757.68 volts or 17,182.16 M. U., minimum 15 min. reading 4173.07 volts or 6,665.23 M. U., or, for the total alpha radiation of the radiorem stick, a maximum of 146,619.6 volts or 234,021.01 M. U. in one hour a minimum 15 min. reading of 56,837.2 volts or 90,777.43 M. U. in one hour. If we multiply these figures by the number of hours, a considerable amount of radiant energy in alpha and beta rays is applied, in accordance with the claims of other authors, we cannot be surprised that a therapeutic result must be the consequence of such an application.

²The activated magnesium sulphate ointment determined on April 17, 1915 (test 1391) showed the following radioactivity for 1 gram of substance: As expressed in beta rays, a maximum with 1 min. reading 193,790.5 volts or 509,522.2 M. U. Further readings were impossible, as the radiation was so powerful to cause the rapid collapse of the leaflets of the contactoscope. The alpha radiation (test 1392) amounted to a maximum in 1 min. reading for one hour and 1 gram substance to 23,793.9 volts or 45,939.72 M. U. Also here further readings were rendered impossible, as the discharge of rays resulted in the rapid collapse of the leaflets of the instrument. From the physical findings of such an ointment a therapeutic result in the relief of the morbid symptoms was suggested.

patient attended to his strenuous activities as a business man. With five such treatments the complaints of the patient had entirely disappeared, and after a period of over nine months the patient has had no recurrence of his former trouble at all. In this particular instance the rapid improvement of the patient was striking. With all other methods of treatment continued for several years he had experienced hardly any relief until he was treated in the manner indicated above.

CASE V.

F. H., Hyde, Md., aged 33, farmer. Admitted August 23, 1915, discharged September 7, 1915. Complaint, rheumatism. *Family history*.—Nothing important. Father in good health, mother insane since one year; one sister and 2 brothers living and well; one brother dead of accident. *Personal history*.—had whooping-cough when 8 years old, urticaria at age of 10, rheumatism at age of 16. Other history absolutely negative, also concerning venereal infections. *Exposure*.—Has been driving a milk wagon for the last 23 years. *Habits*.—Inveterate tobacco chewer. *Present illness*.—Since 10 years of age patient has had numerous attacks of rheumatism affecting hips, knees, ankles, shoulders, and elbows at various and varying intervals, particularly during damp, wet weather. At the present time he notices slight pain in hip and knee, while other joints are unaffected. Patient has never been confined to bed, except for his present manifestations—namely, shooting pains along his left sciatic nerve, dull aching sensation in his right hip, both knees and around the abdomen and lower portion of the thorax. *Alimentary tract*.—Except slight discomfort and heaviness after eating and flatulency, no digestive disorders. *Pulmonary system*.—Easily inclined to catch cold and subject to pains in his chest while breathing deeply. *Cardiac system*.—Only dyspnea on exertion. *Urinary symptoms*.—Negative, except nycturia. *Nervous manifestations*.—Occasional frontal headache with dizziness. *Special senses*.—Patient is myopic; ears are entirely stopped up, but relieved by syringing. *Physical examination*.—Marked pyorrhea, false set of teeth in upper jaw; poor preservation of lower teeth, with numerous cavities; other findings in head negative as well as in the neck, lungs, and abdomen.

Heart.—Normal. Apex 3 inches from midsternal line in fifth interspace, sounds normal. Systolic blood pressure, 108; diastolic, 60, with average pulse rate of 64, 10/752 mm. Hg. pressure for 1 minute. *Nervous system*.—No muscular atrophy of legs; reflexes of the lower and upper extremities are exaggerated.

At a later examination following additional findings are obtained. Deviation of the lumbar vertebræ third to fifth, with marked tenderness over an area of 1 inch in diameter, 1 inch to the right of median line. On deep pressure over this area the patient indicates violent pain and contracts the right lumbar muscles. Marked tenderness along the right sciatic nerve extending to the head of the right fibula. Gait limping on account of condition of his right leg.

X-ray findings.—August 28, plate No. 6361, early osteoarthritic changes in the lower right lumbar vertebræ and in the sacroiliac articulation, slight tilting of the left lumbar vertebræ.

Laboratory findings on August 24.—Urine acid; specific gravity, 1025; no sugar, albumen, or casts; a few calcium oxalate crystals and epithelial cells; 5.7 grams urea in twenty-four hours, no albumen, but a few red and white blood cells and hyaline casts. Blood: hemoglobin, 80 percent; leukocytes, 5,200; red blood cells, 3,390,000; polymorphonuclears, 55 percent; small mononuclears, 41 percent; large mononuclears, 2 percent; eosinophiles, 1 percent;

basophiles, 1 percent. Wassermann test negative. Stomach content; free HCl, 23; total acidity, 73; no blood, small amount of mucus, many starch granules, few squamous cells and yeast cells.

Temperature at entrance, 99.8° F.; pulse, 88; respiration, 26, with subsequent tendency to subnormal temperature, slow pulse and respiration.

From August 23 medication consisted in triple bromides, 15 grains, and phenacetin, 5 grains t.i.d. Compound licorice powder, 2 drams in the morning. August 25, potassium iodide, 20 grains t.i.d.; strychnine sulphate, 1/60 grain every four hours. August 26, sodium salicylate, 10 grains t.i.d. were given without being followed by the least relief or improvement in the local and general subjective findings.

On August 31 local applications in the form of compresses of radioactive magnesium sulphate solution to the right leg were made, which were followed by considerable relief, patient being able to sleep, which had been impossible with the previous medication. On September 1 the dose of sodium salicylate was reduced to 5 grains t.i.d. and discontinued entirely on September 4. To the right lumbar region the ultraviolet energy was applied for five minutes (10 M. A.). The patient on September 1 felt very good, and had hardly any complaints to make; the magnesium sulphate applications were made only during the night. The patient, instead of being in bed all the time, was allowed to walk around, which exercise he could not perform before, but at this time he experienced no disturbance whatever. A second application (10 M. A.) 2 and a half minutes to the right sciatic, and 10 M. A. 2 minutes to the right sacroiliac joint was given, followed by absolute subjective and objective wellbeing.

The physical findings on September 7 are noteworthy. No more tenderness by deep pressure along the right lumbar region at a level from the third to fifth transverse process of the sacroiliac joint, total absence of tenderness on deep horizontal and vertical pressure upon the pelvis; slight pain noticed during these movements in the right hip joint by pressure upon the great trochanter. Ventral inclination, backward extension, lateral inclination to the right and left in lumbar region, produce no pains at all; spontaneously patient states that he is absolutely free from pain.

CONCLUSIONS.

A short review of the five cases reported demonstrates the possibility of a rapid improvement of the patient's subjective troubles in cases of sciatica by means of the direct application of mesothorium and radium. This rapid improvement within a few hours or a few days is striking when compared with the slow progress attained by medical treatment. Not only is it possible to reduce the suffering of the patient, but also from an economical standpoint, it is possible to shorten the duration of the disease (Cases I, II, IV, V). Objectively we notice the disappearance of indications of local tenderness on pressure and an increase of the functional endurance of the previously weakened limb.

In cases where osteoarthritic deformities cause pressure upon the emerging nerve, the question is still in the experimental stage as to how far it is possible to change and check the process of proliferation by the continued application of radiating energy. Of course, if such a result is not within therapeutic reach with the progress of the arthritic deformities, further pressure symptoms

are necessarily to be expected. For the purpose of a good therapeutic result, high doses of radiating energy are desirable, doses from 270,000, 450,000 to 1,880,000 M. U., which amounts, so far as observed, do not cause any injury to the exposed tissues.

As to the application of radioactive magnesium sulphate solutions, in a former publication (8, 9, 12) I have demonstrated its therapeutic effect in cases of subacute and chronic rheumatism, and, encouraged by the results, have made further use of this substance in allaying pain and inflammatory symptoms. As a result of former investigations (9, 10, 11) I have found that, by passing the high frequency current through substances in powdered form, these substances became radioactive, (i. e., present qualities similar to those of radium itself—namely, emit rays of different penetration power. It is at least probable that their action compares with that of radium itself.

The clinical results with such treatment—corpuscular radiotherapy—are at least encouraging and will be reserved for later publication. The present publication may, therefore, be of interest for the practitioner who, confronted with chronic cases of sciatica, after unsuccessful therapeutic attempts is inclined to renounce a chance for improvement or recovery of such patients.

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ULCUS VENTRICULI WITH ATYPICAL SYMPTOMS.

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The above term was chosen instead of the usual designation, "atypical ulcer," used in text-books, for the following reasons: when we speak of atypical ulcer, it tends to signify that the great majority of cases are characterized by a typical symptom complex. In reality, the reverse holds good, inasmuch as the more advanced diagnostic methods and surgical results have often demonstrated ulcer of the stomach when the symptoms have least indicated it. Furthermore, the term atypical applied to any disease is such as to make an explanation superfluous. A diagnosis, therefore, remains in the domain of the experienced. This is not justifiable in ulcer of the stomach, a disease so frequent, and in which diagnosis should and can be established even if the case presents atypical symptoms. As we feel that there are existing reasons for the occurrence of atypical symptoms, and even lack of symptoms, we have selected the title, ulcer with atypical symptoms, instead of atypical ulcer.

The typical symptoms complex described under simple and complicated ulcer is encountered in a minor number of cases; in the vast majority the symptoms are not characteristic and still *ulcus ventriculi* exists.

What are the underlying conditions of either local or general nature which may so influence the symptom complex of *ulcus ventriculi* as to render a positive diagnosis very difficult. A number of factors tend to modify the symptom complex.

FIRST FACTOR.

First, the general status, which in turn often corresponds to the sensitiveness of the individual. The well-known *status asthenicus* (Stillers) is predisposed to all known nervous complaints. At one time cephalalgia, at another time cardiovascular or sensory chest symptoms, at still another time abdominal symptoms will prevail. Such individuals, as first pointed out by Eppinger and Hess, are vago- or vago-sympatico-toniaes. Von Bergman and his pupils were the first to demonstrate experimentally and clinically that vagotonia in such cases is the predisposing factor to an ulcer. Clinical verification of this fact is established by numerous authorities abroad and in this country, such as Kauffman, Kast, Fisher. The patho-

logical relation of *ulcus ventriculi* to vagotonia was demonstrated by Roessle and others.

We see, therefore, that the asthenic type, which until recently was always considered purely neurotic, is really subject eventually to organic disturbances. We also observe (as pointed out in our article on *Ulcus Ventriculi*—*Arch. Int. Med.*, March, 1916, p. 426-470) that if an asthenic individual develops an organic disease, on the basis of his status, the local symptoms supervene and even exist in exaggerated degree, whereas the general neurotic symptoms lessen.

The exaggeration of the local symptoms, in conjunction with whatever symptoms of the general neurosis are left, often masks the true nature of the disease. In the normal individual symptoms of a disease are in almost equal proportion to existing functional disturbances, and hence a complete history brings us close to a correct diagnosis, but it is different with individuals of the vago- or vago-sympatico-toniac type. Of the disturbed functions of the stomach associated with ulcer (secretory, sensory, and motor), one or another, if present, is so exaggerated subjectively, objectively, or both, that the question of diagnosis is a very difficult one.

In the case of secretory disturbance, patients show such an excess of gastric secretions that they are annoyed day and night by pyrosis and sour fluid coming into the mouth, so that pharynx, mouth, and gums may become eroded, the tongue unusually red and angry-looking, and the teeth dulled. Objectively, both on an empty stomach and after a test breakfast, large quantities of secretions of varying acidity can be obtained.

The sensory disturbances during such a stage are insignificant in comparison with the secretory disturbances. The hypersecretion was until recently considered by Reichman an independent disease. Its existence as such in neuro- and psychopathic individuals or in organic nervous diseases (*tabes dorsalis*) cannot be denied. As a functional gastric nervous disease, however, it is unusually rare. Such excessive secretory disturbance speaks in the majority of cases for *ulcus ventriculi* or *ulcus duodeni*. History alone will not establish the diagnosis. Only a complete objective examination, including a study of the general status and x-ray findings, will lead to a correct diagnosis.

If the sensory gastric symptoms predominate, they likewise lack the characteristics as to intensity, radiation, and duration. The pains during attacks are of such severity that narcotics must often be resorted to. It is found, however, in contradistinction to gall-stone attacks, that narcotics aggravate the symptoms; this is due to the fact that pain is the outcome of the persistent spasm of the sphincter pylori, which is made worse on the administration of morphin. Atropin, on the other hand, will often ease such pain.

Radiation on account of irritability of the vagus is widespread up to the chest or down to the abdomen. Other signs of vagus irritability are also present, such as salivation or frequent urination. When the latter feature is accompanied by burning urination on account of phosphaturia due to gastric hyperacidity and neurosis, the differentiation between a functional gastric disease, disturbed intermediary metabolism, and a genitourinary affection is very difficult. The duration of the attacks is unusually long, and even during intervals there is never entire freedom from pain. If such patients are allowed to progress with a nonestablished diagnosis, the emaciation and secondary anemia will still further mask the true nature of the disease.

In some cases symptoms resulting from disturbed motility of the stomach are most conspicuous. Such individuals feel peristaltic unrest in the stomach, a gnawing sensation, and continuous desire to eat. They find, however, that, after eating a few morsels, fullness and distention in the epigastrium, belching, and later eructation of sour fluid result. Heavy and spicy foods are especially troublesome.

Nausea due to acid secretions irritating the duodenum (Boldyreff) is likewise a very annoying symptom. Sometimes vomiting of part or all the food, followed by immediate relief, is the most persistent and outspoken symptom. This has led earlier authors (Riegel, Hemmeter, and others) to speak of a "vomitive" type of ulcer.

Secretory, sensory, and motility disturbance may in succession occur in the same individual at different times. It is, therefore, not surprising that the above outlined symptom complex and the changeability of symptoms lead one to make a diagnosis of neurosis. Improved methods of examination, however, should guard against mistakes, so that further progress of the disease tending to serious complications may be prevented.

Thus far the atypical symptoms in hypersensitive people have been discussed.

In contradistinction to these, there is a class of individuals who are relatively indifferent to sensory disturbances, so that even pathologic lesions bring about insignificant subjective complaints. They quiet their pains, due to gastric or duodenal ulcer, with a little bicarbonate of soda and then continue their indiscretions in diet. In these patients the first positive sign of ulcer of the stomach may be severe hematemesis, or even perforation. This has caused some authors to call the ulcer atypical, others to term it acute ulcer, while in reality it may have existed for many years. Riegel, Hemmeter, and others speak of the "perforative" and "hemorrhagic" type of ulcer.

SECOND FACTOR.

The symptoms of ulcer of the stomach will sometimes assume a very atypical character because of the mode of life the patient leads. Extremes, both of denial and excess in mode of living, may mask the existence of an ulcer. One meets patients who give a history of having had at one time or another typical attacks of ulcer of the stomach, sometimes even hematemesis. Ever since going through the first course of treatment they have continued to be extraordinarily careful as to diet, reaching a point of under-nourishment resulting in secondary anemia and acquired enteroptosis. Such a condition prevents healing of the ulcer and may even lead to the formation of new ulcers.

The gastric complaints are practically continuous and consist of gnawing sensation in the epigastrium, belching and eructation. nausea, and, if more free acid is present, severe pyrosis and some pains independent of meals.

Neuralgias in different parts of the body because of the existing anemia and obstinate constipation simulate neurosis so much that a faulty diagnosis is easily made.

In contrast with this class of patients, there are those who, notwithstanding the fact that from time to time they have severe symptoms due to an existent ulcer, lead a most irregular life as to habits (smoking, drinking, quality and quantity of food, and time of eating). They reach a stage when they have symptoms in a mild or severer degree of a more continuous nature, which may simulate any intraabdominal disease, so atypical are they. At one time secretory symptoms predominate (pyrosis, sour eructations), at another sensory disturbances (pain independent of food), and at still another time motility disturbances predominate (retroperistalsis, causing vomiting), or hypermotility of the entire gastrointestinal tract, creating the desire to go to stool soon after meals; or there may be delayed motility with stagnation phenomena not the result of organic pyloric stenosis, but the outcome of the existing spasm, especially pylorospasm.

It is just the changeability of the symptoms in these patients that is a misleading feature in diagnosis. This condition is easily explained on the ground that the continuous maltreatment of the local lesion does not allow the ulcer to heal. The short intervals of comparative comfort of the patient, in obedience to the law of adaptability of the diseased organ, are abused through faulty mode of living. These are the progressive cases which terminate in complete stenosis of pylorus or perforation, or implantation of carcinoma on the ulcer.

THIRD FACTOR.

A third condition is where the gastric ulcer is associated with chronic gastric catarrh. It should be emphasized that chronic

catarrh of the stomach, *sui generis*, is very uncommon. It is usually secondary (alcoholism, circulatory disturbances, metabolic diseases). It is a clinical fact, however, which cannot be denied, that some patients with ulcer of the stomach suffer from an associated catarrh which alters the symptoms to such an extent that a proper diagnosis becomes very difficult. A catarrh may be the result of stagnation and fermentation due to pylorospasm, or, more rarely, the result of associated circulatory or metabolic disturbances.

The symptoms will depend on whether the excess of mucus neutralizes the acidity (gastritis subacida or anacida), or whether acidity remains normal or even higher (gastritis acida). In the former case the epigastric fullness and distress, especially after meals, loss of appetite, nausea, and extreme dryness in the mouth, the bad taste and coated tongue, will predominate; in the latter we find, in addition to the above-named symptoms, persistent pyrosis. In neither case are there any complaints that would speak for ulcer. The first clue to the presence of ulcer is often given by trying to establish the causative factor in the disease. From the history we may learn that at any earlier age a woman or a man had symptoms, chlorosis at puberty in the former, pointing to ulcer.

FOURTH FACTOR.

To another group of cases in which, clinically, the symptoms of *ulcus ventriculi* are masked belong those in which, besides the gastric ulcer there is present an extragastric organic disease. Such patients may refer their symptoms to the other affected organ, or the physician may erroneously do so. We have met patients with organic heart disease who showed a moderate degree of decompensation and associated atypical gastric symptoms.

It is rightfully customary to put all symptoms under one; this should not, however, divert us from making a complete gastrointestinal examination in indicated cases in order to establish a proper diagnosis. A case of mitral stenosis, with auricular fibrillation, moderate enlargement of the liver, and gastric symptoms, was under our observation, which we first treated for cardiac decompensation, believing the gastric symptoms to be secondary. The persistence of the stomach complaints, however, led us to a suspicion of an independent gastric affection, which, on complete examination, proved to be pyloric ulcer. Therapeutics directed to gastric ulcer relieved the gastric condition.

What is true of cardiac disease can with greater emphasis be affirmed of pulmonary tuberculosis.

It is clinically known that patients afflicted with pulmonary tuberculosis very frequently have gastric symptoms. Many authors have found tubercle bacilli in the gastric contents and attributed the gastric symptoms to these findings. From the studies of

Smithies on the findings of bacteria in the stomach which are swallowed from an infected mouth, tonsils, etc., we know that all cocci are made inactive by the hydrochloric acid in the stomach. Bacilli, on the other hand, do not necessarily lose their virulence. The tubercle bacillus especially, being acid-fast, may give rise to gastric hyperemia and accompanying symptoms. Very rarely does one meet with a tubercular ulcer of the stomach. Others with active pulmonary tubercles have gastric symptoms due to the existing subacidity. We refer chiefly to cases where the symptoms do indicate the existence of a possible gastric ulcer. Our finding of pulmonary tuberculosis, however, makes us look lightly on the gastric symptoms until a complete examination really discloses that an ulcer exists.

Both cardiac and pulmonary symptoms are liable to be aggravated by an untreated gastric ulcer.

Often the symptoms of gastric ulcer are found masked by a co-existing chronic appendicitis or gallbladder affection.

The two affections may manifest themselves in one of two ways: cases in which at one time typical symptoms of ulcer existed, even hematemesis; after the subsidence of the ulcer symptoms, dyspeptic complaints of an indefinite nature remain. The importance of making a proper diagnosis in these cases lies in the fact that the ulcer is prevented from healing by a chronic appendicitis. It has been our experience that these cases can best be diagnosed with a fair degree of certainty by means of the x-ray.

The stomach shows increased peristalsis, six hours residue, due to spasm of the sphincter pylori; in addition to this, the ileum in the region of the cecum likewise contains a great deal of the contrast substance, proving a delay in the ileum six hours after a contrast meal. A delay in the ileum signifies, in the great majority of cases, a lesion of the appendix.

We like to call attention to the fact that a difference is to be made between a mere delay in the emptying of the ileum and ileac stasis. A delay in the ileum signifies that the ileum empties later than normal. Normally, we find but little contrast substance in the ileum six hours after a meal. When there is a delay in the emptying of the ileum, one finds, six hours after the contrast meal, a large quantity of contrast substance there. Unlike ileac stasis, however, all or most of the contrast substance has left the ileum within eight or nine hours. A delay in the emptying of the ileum results either when there is delay in the emptying of the stomach or when digestion in the stomach is deficient (sub- or anacidity); in these cases the small intestines (duodenum, jejunum) carry out compensatory digestion. Another cause for the delay may be spasm of the sphincter of the ileocecal valve, a frequent accompaniment of obliterative appendicitis, and, finally, it may be due to incompetency of the ileocecal valve.

In ileac stasis the contrast substance stays in the ileum well beyond twelve hours, and is mostly indicative of disease in ileum proper (Jacksonian membrane, Lane's kink). Additional x-ray information, as to the existence of chronic appendicitis is offered by the palpatory immobility of the cecum, faulty position of the cecum—either on a line with the crest of the ileum, which indicates a retrocecal appendix, or very low, almost reaching the symphysis and immobile, and, finally, the poor drainage of the appendix, so that the organ contains contrast substance days after the colon has been free from such.

To the second group of cases belong those in which the symptoms of gastric ulcer predominate, notwithstanding the fact that an associated chronic appendicitis or gallbladder disease exists. Such patients have typical symptoms of ulcer occurring periodically; ulcer treatment brings temporary relief. It is therefore most essential to establish the diagnosis of both appendicitis and ulcer, as the latter has a continuous tendency to progress when the diseases coexist. When there is only a simple ulcer together with chronic appendicitis, the removal of the diseased appendix may cure the ulcer without a gastroenterostomy.

FIFTH FACTOR.

Ulcers with persistent subacidity or even anacidity make a diagnosis especially trying. The symptoms are very indefinite and changeable, and the cases are usually of very long duration. The age of the patient (middle age) makes one highly suspicious of an incipient carcinoma. Only a most exact clinical and laboratory examination leads to a correct diagnosis. Attempts have been made to explain the low or absent acidity on the basis of exhaustion of the acid glands. While this is plausible in certain cases, additional explanations are here offered.

Adhesions around the pylorus are most often responsible, because the normal contraction of the pylorus is interfered with, preventing the complete closure of the sphincter, whereby a regurgitation of intestinal and pancreatic accretion into the stomach diminishes or completely neutralizes the acidity. Adhesion of the stomach to the pancreas or liver is also the cause of diminished contraction in the corpus of the stomach, influencing the pyloric part to close incompletely.

In certain cases of *ulcus ventriculi* the subacidity or anacidity can be attributed to a coexisting congenital or acquired sympatoc-tonia. Individuals with a congenital sympatoc-tonia developing an ulcer will always show subacidities or even anacidities. Vago-toniacs developing gastric ulcer in early adult life with marked hyperacidity may, after middle life, become sympathicotoniacs, with resulting subacidity or anacidity. Finally, an associated gastric

catarrh with ulcer, with excessive mucus in the stomach, will be the cause of subacidity or anacidity.

SIXTH FACTOR.

Another disease with which *ulcus ventriculi* may be associated, and to which special attention must be called, is *tabes dorsalis*. The frequent occurrence of gastric crisis has too often been mistaken for gastric ulcer. Such a mistake is avoidable when a careful examination of the nervous status is made. There is great difficulty in diagnosing *ulcus ventriculi* in a patient with *tabes dorsalis* because one rightly thinks of gastric crisis, and is aware that even *hematemesis* may be the result of gastric crisis without any existing ulcer. Where there are attacks of typical gastric crisis and an associated ulcer of the stomach, an exact diagnosis is really impossible, and most of the cases reported in literature thus far have been discovered on the postmortem table.

It is different, however, when a patient suffering from *tabes dorsalis* has had no gastric crisis, but gives the symptoms of *ulcus ventriculi*. Here it will at once be most natural to attribute the gastric symptoms to crisis. The clinical symptoms are of great service in avoiding a mistake.

Gastric crisis comes on suddenly with excruciating epigastric pain, nausea, and vomiting. Even morphin may give only temporary relief. The attacks, lasting days, weeks or even months, lead to marked emaciation and terminate abruptly. Just as soon as the symptoms subside, the patient feels entirely well and can eat anything without injurious effect. Some patients may during an attack have only pain, others only nausea, and still others only vomiting. Whatever it is, the abrupt onset and abrupt termination are the characteristic features.

In *ulcus ventriculi*, on the other hand, whatever symptoms are in the foreground—be it pain, nausea, vomiting, or *hematemesis*—the dependence of the symptoms on meals, the response to treatment, periodicity, and the fact that even during intervals sins in diet will cause a recurrence, ought to aid in the diagnosis. Chemical examination of gastric contents is in the majority of cases of considerable assistance, inasmuch as most gastric crises show subacidity or anacidity, while most ulcers show normal or hyperacidity.

The status of the individual suffering from *tabes dorsalis* may assist us to differentiate gastric crisis from *ulcus ventriculi*. Careful observers, both among neurologists and internists, have found that patients afflicted with *tabes dorsalis*, if they are *vagosympathicotoniaics* or of the mixed type, are much more prone to gastric crisis than individuals of a normal status.

Vagotonia in nontabetic individuals predisposes to *ulcus ventriculi* because of their tendency to hypersecretion and hyperacidity.

The tabetic with vagotonia has mostly subacidities or anacidities, and hence there is no such tendency in the stomach to ulcer formation.

X-ray examination of the stomach is of decided value. Gastric crisis examined during attacks shows gastrospasm, often pylorospasm alone. The patient, although vomiting the contrast substance in the course of the examination, still shows 6-, 12-, and even 24-hour residues. This indicates that it is not the continuous spasm of the pylorus alone which retains the food in the stomach, but the regurgitation of the intestinal juice into the stomach, keeping the contrast food in suspension. In ulcer of the stomach there are definite roentgenological findings in the majority of cases.

SEVENTH FACTOR.

It is important and interesting to note that some cases of ulcer of the stomach present the entire symptom complex of a true angina pectoris. Von Neusser observed such cases clinically and some were followed to the postmortem table. At no time were there any symptoms pointing to gastric ulcer. In one of his cases the diagnosis was cleared up by a gastric hemorrhage, which led to the proper therapeutic procedure and disappearance of the anginal attacks.

EIGHTH FACTOR.

In some cases of *ulcus ventriculi*, especially when situated at the pyloric sphincter, we find a very atypical symptom complex. Patients walk around almost free from any gastric symptoms; they eat and drink everything without any ill effect. Suddenly, mostly late at night, they are awakened by severe gastralgia confined to the upper quadrant of the abdomen, distress, burning, and nausea. They make every effort to induce emesis. Soon after vomiting, relief is experienced. The vomitus consists of food, often taken twelve and even twenty-four hours before, and a large quantity of sour secretion. It should be emphasized that with subsidence of the attacks there is complete freedom from symptoms irrespective of what the patient eats.

Such a symptom complex is due to spasm of sphincter pylori (pylorospasm), on account of which marked delay in motility of the stomach results. The delay, however, is mostly of a transient nature dependent on the persistence or nonpersistence of the pylorospasm. By means of the stomach tube large quantities of secretions and food taken twelve and twenty-four hours before are usually obtained.

In contradistinction to persistent pyloric stenosis due to callous ulcer or pressure from without, products of decomposition and fermentation, *sarcinæ* and fatty acids—are not found.

The sudden cessation of pain occurs when the hyperacid secre-

tions are subdued either by emesis, lavage, diet, or appropriate medication. Not infrequently mental and bodily rest or change of climate has a marvelously beneficial effect.

This is the reason why such patients are considered purely neurotic. It is quite likely that the ulcer, whether superficial or deep, is primarily the result of a neurosis, so that any new detrimental influence on the nervous system gives rise to gastric symptoms, which subside when the causative factor is removed.

It is evident that these atypical attacks make the establishment of a proper diagnosis very difficult. Cholelithiasis, gastric crisis, abdominal vascular crisis of an angioneurotic origin, pancreatic stone, and nephrolithiasis will have to be excluded.

The atypical symptom complex is to be sought in one of the following groups:

1. Vagotonia.
2. Mode of living.
3. Associated gastric catarrhs.
4. Extragastric organic disease.
5. Ulcus with sub- or anacidity.
6. Ulcer associated with tabes dorsalis.
7. Symptoms resembling angina pectoris.
8. Ulcer at sphincter pylori.

CONCLUSIONS.

The typical symptom complex alone as described in text-books is only of partial benefit in establishing a diagnosis, as is only too often demonstrated on the operating table. To make a diagnosis of ulcer, we must employ all clinical and laboratory means. The fluoroscope and x-ray are in most cases indispensable, and often furnish the only conclusive clue to the diagnosis.

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DIAGNOSTIC AND THERAPEUTIC NOTES.

BORIC ACID IN SEPTIC INFECTIONS.—Ochsner (Surg., Gyn., and Obst., Feb., 1917, XXIV, No. 2, p. 157, abstr.). In using solutions of boric acid as a wet dressing, it has been determined that the concentration of the solution is of the utmost importance. A saturated solution of boric acid, when applied to the skin, will invariably appear in the urine in appreciable quantities within an hour, and, if a wet dressing is kept in place for a considerable time, the amount of boric acid which appears in the urine may rise as high as 2/10 of 1 percent. These chemical experiments, as well as clinical experiences, prove rather conclusively that, in order to be effective, boric acid must be used in saturated solution. While boric acid does not destroy pathogenic bacteria, it generally reduces their virulence, as has repeatedly been demonstrated by injecting pus, withdrawn from septic infections, into test animals before and after the application of boric acid dressings. If the pus is aspirated before the boric acid has been used, it will kill the test animal in very much smaller quantities than that which has been removed after the dressings have been applied, although ordinarily pathogenic bacteria become more virulent by being passed through a human host. In order, however, that boric acid may reach its maximum of efficiency, some other directions should be observed, such as absolute rest in bed; proper attention to elimination by the lungs, skin, bowels, and kidneys; relief of pain, if possible without the use of opiates, by the addition of from 10 to 33 percent of 95-percent alcohol to the solution, painting the inflamed area with 95 percent carbolic acid until it turns white and then removing the excess carbolic acid with alcohol; elevation of the extremity with the muscle surrounding the involved joint at equilibrium; incision only when there is macroscopic evidence of pus and after a certain degree of immunity has developed. If incision becomes necessary, an Esmarch bandage should first be applied whenever possible, and then the incised wound should be swabbed with tincture of iodine before the Esmarch is removed, and the part should be manipulated as little as possible. If all of these precautions are observed, septicemia, pyemia, and impairment of function will rarely occur.

DIAGNOSIS AND SERUM TREATMENT OF ANTERIOR POLIOMYELITIS.—Zingher (Jour. Am. Med. Assn., March 17, 1917, LVIII, No. 11, p. 817). For purposes of treatment it is important to diagnose infantile paralysis during the pre-paralytic stage of the disease. This is possible on account of the typical group of early symptoms and the changes in the spinal fluid. The symptoms are fever, slight rigidity of the neck, jerky movements, and fine tremors of fingers and hands. The spinal fluid is opalescent, having a ground-glass appearance. When this fluid is shaken in a test tube, a much more intense and persistent foam is produced than with normal serum. These bed-side tests, together with the symptoms, alone suffice for diagnosis. The laboratory examination will show an increased number of lymphocytes, an increased amount of albumin and globulin, and a marked reduction of Fehling's solution. The treatment recommended by the author consists in the injection of fresh human immune or even normal serum into the spinal canal.

BOOK REVIEWS.

THE ADOLESCENT PERIOD. Its Features and Management. By Louis Starr, M. D., L.L. D., Fellow of the College of Physicians of Philadelphia, etc. Philadelphia: P. Blakiston's Son & Co. 1915. Price, \$1.

The physical and mental changes that occur in the period of life between the end of childhood and the beginning of adult life form the subject matter of this little volume. The author describes normal growth, the development of muscle power, the beginning of functional activity in the sex glands, and most conservatively points out the possible deviation from normal and dangers incident to these profound changes. How the evolution of adolescence into healthy and useful maturity can be secured by prophylactic efforts is well set forth in chapters dealing with physical education and sexual enlightenment. The particular fitness of the author to write on these topics in a clear language well adapted also for the intelligent nonmedical reader is best exemplified in this last-mentioned chapter on sexual enlightenment. This little volume will prove equally as useful to the physician as to parents.

A REFERENCE HANDBOOK OF THE MEDICAL SCIENCES. Embracing the Entire Range of Scientific and Practical Medicine and Allied Sciences by Various Writers. First and second editions edited by Albert H. Buck, M. D. Third edition, completely revised and rewritten. Edited by Thomas Lathrop Stedman, A. M., M. D. Complete in eight volumes. Volume VII. Illustrated by numerous chromolithographs and 469 halftone and wood engravings. New York: William Wood & Co. 1917.

This is the penultimate volume of this invaluable work of reference. The articles dealing with the more stable, more static aspects of medical science are well up to the high standard set by the preceding volume, and it would be difficult to find higher praise for them.

French newspapers used to be accused of carrying tomorrow's date and yesterday's news. This must also be inevitably true of a great deal of the matter dealt with in a work such as the present which attempts to cover the whole ground of medical science, including those parts of which are under intensive cultivation and bearing crops in rapid succession. This volume is dated 1917, while the information is certainly not of later date than 1915. Thus, Dr. Niles' article on Pellagra does not deal with the experiments of Goldberger, and makes only the most passing allusion to the deficiency diet view of the etiology of this disease. Yet this theory, although not universally accepted, is so far the official view that the United States Public Health Service lies under the reproach, not wholly unjustified, of having made itself the press agent of this particular scientific theory. Another instance of the same kind is the article on poliomyelitis. Much of the information on this subject is out of date. The necessities of the preparation of such a work make inevitable such obsolescence of parts, and render it doubtful whether any real service is rendered by attempting to deal with the more dynamic parts of medical science in an encyclopedic form. This excuse does not explain the wholly inadequate treatment of the subject of paratyphoid fever. Any one reading the less than a column article on this disease would gather no idea of the importance of the subject, which has attracted such an immense amount of attention of recent years. No mention is made, for instance, of its connection with food, and in particular with the so-called ptomaine poisoning.

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EDITORIAL.

SOME FOOD TOPICS OF WARTIME.

That the world is short of food at the present moment and that it faces a greater dearth in the new future is a proposition that needs no laboring. The causes are numerous and complex. Apart from unfavorable meteorologic conditions which have prevailed in the grain-producing regions, and which would, in any circumstances, have diminished the crop of cereals, the consequences, direct and indirect, of the war must be reckoned with. Thus the principal source of potash for fertilizer, the Stassfurt region, is cut off from the rest of the world, while the reduction of tonnage and the non-availability of Russian wheat contribute to the shortage. Diet problems are therefore of the most critical actuality, to translate a phrase of our French allies. An examination of some of the salient points of these problems should therefore be welcome. No attempt will be made to do more than give a few pointers, exhaustive treatment being out of the question.

FOOD REQUIREMENTS OF THE HEALTHY.

Energy Supply.—The first problem that presents itself is the determination of the daily energy requirements. Experiments *ad hoc* and observations carried out on all classes of the population, with a view to determine the number of calories which a daily ration should provide, have yielded somewhat divergent results. Intensive and extensive study induced by the dire necessities of wartime has cleared away much obscurity and reconciled many contradictions. As a result, it is fairly generally conceded that the daily energy requirements of an average male adult, in a temperate climate, are as follows: In light work, 3,000 calories; in moderate work, 3,500 calories; and in heavy work, 4,000 calories or more (Bayliss, *The Physiology of Food and Economy in Diet*, London, 1917). The

British Food Controller, advised by a strong board of experts, adopted a scale according to which a child of 8 received half as much as an adult, a boy of 12 three-fifths, and a boy of 16 as much as his father. This scale has been severely criticized. Present opinion tends toward allowing a boy of 12 as much food as a man in light work. For an adult woman in ordinary work 3,200 calories *per diem* is reckoned an adequate energy supply.

Composition of the Ration.—In what proportions we should draw upon the three great classes of food stuffs for this energy is the next question to be taken up. Here again, as the result of many compromises, the following distribution has been accepted as a fair and convenient average, easily attained on an ordinary mixed diet. The carbohydrates are drawn upon for 60 percent, the fats for 28 percent, and the proteins for 12 percent of the total energy.

Taking a daily requirement of 3,300 calories, these would, on the above distribution scheme, be supplied by a diet composed of 500 grams (18 ounces) of protein, 100 grams (3 $\frac{3}{4}$ ounces) of fat, and 100 grams (3 $\frac{3}{4}$ ounces) of protein. On a mixed diet it may be said: "Take care of the calories and the proteins will be taken care of."

The question as to how far the ability of the body to build up the expensive fats from cheap carbohydrates should be depended upon is not easily settled in the form of a general rule. It varies a good deal with the individual digestive capacity. The decision is influenced in no small degree by the fact that without fat, for cooking, the presentation of relatively monotonous food in a tempting fashion is very difficult. This seems to be the general complaint in Germany at the present time.

In calculating diets, a pitfall awaits the feet of those who rely on mere analysis of foodstuffs. It is necessary to know the assimilability of the components of a foodstuff, and this does not show in an analytical report. Thus nuts, in addition to their readily available oil content, yield on analysis a high percentage of protein. This, however, is only available for human food after very fine division and cooking of the nut.

A similar fallacy has led to misconceptions concerning the real economic advantages obtained by milling whole wheat meal. It is frequently asserted, on analytical grounds, that the removal of the germ of the wheat grain in milling removes an important element of the food value of the cereal. Now, were we depending entirely or almost entirely for nourishment upon the wheat grain, this would be true because it appears that the embryo or germ contains necessary accessory factors. These, however, are present in sufficient quantity in any mixed diet and are not shown in the results to which the appeal is made. It is not upon them that the argument for the retention of the germ is based, but upon its high protein content.

It has, however, been shown that this protein of the germ is very largely indigestible, and, therefore, not available as food for man. This is no argument against the conversion into flour of a larger percentage of the grain in war-time than it is the practice to produce in peace-time. The justification for this measure does not rest upon higher nutritive value of the flour so produced, but upon the fact that a larger number of loaves can be made from the same amount of wheat without diminishing the food value. It is, therefore, a baking problem. The only other advantage possessed by this kind of flour is that the bran contained in it being indigestible has a stimulating action on the intestines, and, therefore, counteracts any tendency to constipation.

The medical press of the United Kingdom has recently printed many suggestions for the greater utilization of Irish moss and similar seaweeds as *foods*. It is singular that the therapeutic uses of agar agar and its employment as a solidifying agent in bacteriologic culture media should not have educated the profession to the point of understanding that the seaweed jellies depend, for their technical value, upon their imputrescibility and almost absolute indigestibility.

ECONOMY.

While the food problem which calls for solution with the loudest voice in wartime is that of economy, the experience of Europe has shown that distribution is a far more difficult matter to regulate equitably. Fortunately for us physicians, this latter is an administrative problem borne on other shoulders than ours. But in connection with the economical use of food we shall be called upon to advise the alimentation of the sick and the whole, both as individual consumers and as units in institutions.

We have already considered what are the food requirements of the population in calories and in chemical components. It behooves us now, very briefly, to examine the most economical combinations which satisfy these needs.

But before entering on this discussion a word of warning will not be out of place. It is of cardinal importance to provide for variety in diet. Particularly is this the case when, owing to poverty or war conditions, minimum or reduced diets are in force. The tendency in such circumstances is toward a monotonous diet, which, even when some attention has been paid to "balancing," is apt to produce illness. Professor Carlson's observations in this issue on "Appetite" are relevant in this connection. Moreover, we have not yet exhausted the possibilities of those elusive bodies, the "accessory factors." It is well, by insuring variety, even at the sacrifice of some calories, to be on the safe side, and it must be understood that what follows is to be read with this proviso.

We have seen that 100 grams, more or less, of protein should be contained in the daily ration. In an ordinary mixed diet, if the calories are sufficient, the protein element will be ample. In most circumstances the cheapest sources of animal protein are separated milk, buttermilk, and ordinary cheese. The first two yield from $2\frac{1}{2}$ to 3 percent and the last from 25 to 30 percent of protein. The meats, including chicken, are extravagant luxuries, regarded as sources of protein. Fish, though cheap, is surprisingly uneconomical in this respect, owing to its high water content and to the expense of carriage. Only in the form of dried and salted fish can it compete with the milk products.

Vegetable protein is most economically yielded by oatmeal, by the various pulses, and by bread. The first has also a high fat content. Both oatmeal and the pulses yield a considerable percentage of purin bases.

The amount of fat required each day by a man of average weight doing moderate muscular work varies with the carbohydrate intake. But, assuming that diets are made up of ordinary materials, and that there is no special shortage of fat, it will generally be found convenient for such a man's daily fat allowance to be about 100 grams, more rather than less. Much of this will be, unavoidably, consumed in the form of foodstuffs whose main importance is their protein or carbohydrate content. Thus, to cite only one example, rolled oats yield from 6 to 10 percent of fat. The cheapest forms of exclusively fat-yielding food are the various butter substitutes, holding over 80 percent of assimilable fat.

The 500 grams of carbohydrates required, under the conditions laid down, for the daily ration may most cheaply be obtained from rice, three-quarters of the weight of which grain consists of starch. Other sources of carbohydrates which are sometimes cheap and sometimes relatively dear, regarded from this point of view, are: Wheaten bread, oatmeal, potatoes, and sugar. Of these $2\frac{1}{8}$, $1\frac{1}{16}$, $7\frac{1}{2}$, and $1\frac{1}{8}$ pounds, respectively, yield the 500 grams of carbohydrates.

The economical use of food and the avoidance of waste is rather a matter for the domestic science expert to advise on than one likely to be submitted to the physician. In this connection it is interesting to note that the amount of garbage produced in New York city for the first four months of this year shows a reduction of more than 9 percent in comparison with the amount for the corresponding period of 1916. (*Weekly Bulletin of the Department of Health, City of New York, April 21, 1917.*) How much of this economy is due to necessity and how much to the result of education can only be judged when normal conditions as to food prices return, if ever they do.

SAFEGUARDING THE PRACTICES OF PHYSICIANS ON ACTIVE SERVICE.

In the April issue of the *INTERSTATE*, we alluded to one of the most complex and delicate problems involved in the mobilization of the medical profession, that of safeguarding the interests of those who give their services to the army and are thereby obliged to leave their practices. In a letter addressed to the medical press, Major Noble, on behalf of the Surgeon-General, has expressed a hope that the county medical societies will make it their especial care to see that no practitioner shall suffer in consequence of his patriotism.

The conditions prevailing in this country are, in no part of it, identical with those which exist in the United Kingdom and this more particularly because, owing to the non-existence of health insurance legislation, there is no panel. Nevertheless the experience of our brethren over the water and the rules which they have sought to impose on themselves cannot fail to be of interest to us. These rules were embodied in a circular letter addressed in November last by the Central Medical War Committee to all registered medical practitioners.

In that letter, the committee says that a number of complaints have reached it that some practitioners are not recognizing as fully as they should do their moral obligations to professional brethren who have undertaken military service. The committee desires to express the opinion that these obligations should be cheerfully and generously discharged as a privilege as well as a duty.

Many medical men have made and are making very great sacrifices for their country, and the Central Medical War Committee feels that only thoughtlessness can account for the fact that some of those who remain at home are profiting unduly by their neighbors' patriotism. There is, however, much evidence to show that the private practices of many men on active service have almost disappeared, and that this is mostly because practitioners do not take the trouble to ascertain whether new patients were or were not in the habit of consulting doctors now on active service.

The committee would, therefore, invite the attention to the following procedure, which, if carried out, would minimize the loss which must in the end fall on those who leave their practices for any considerable period.

1. On a new patient presenting himself he should be asked the name of the doctor who last attended him. If his doctor is absent on service and has left a *locum tenens*, an attempt should be made to induce the patient to go to the *locum tenens*.

2. If the last doctor who attended is on military service, it should be explained to the patient that attendance will willingly be given on behalf of that practitioner and on no other terms.

3. Any attendance on behalf of such patients should be carefully and sepa-

rately recorded, and a list of such attendances sent at regular intervals to the representative of the absentee.

4. An attempt should be made to ascertain the fees charged by the absentee and a charge not less than this should be made on his behalf.

5. Accounts rendered on behalf of the absentee (if sent in by the deputy) should mention the absentee's name, and monies received should be divided according to the scheme adopted by the Local Medical War Committee.

6. The rule of dividing the fees should be applied to all kinds of work. No exception, for example, should be made as regards operations, inquests, consultation, and anesthetics, unless some special arrangement has been arrived at as regards particular services by the Local Medical War Committee after consulting the local profession.

7. New patients introduced by the patient of an absentee should be regarded as belonging to the absentee's practice.

8. In cases in which the patients' frequent change of doctor leads to doubt as to who should be regarded as the regular attendant, the absentee should be given the benefit of the doubt.

9. No patients attended on behalf of an absentee should be attended by the deputy for at least one year after the absentee's return.

10. The greatest discretion should be used as to the introduction of a partner or in commencing a new practice in an area from which men are absent on service.

11. Great care should be taken in buying and selling of practices. New-comers to a district should be doubly scrupulous in regard to the practices of absentees, and should at once ascertain and join in any arrangements that have been made for the protection of absent practitioners.

12. The honor of the profession is especially involved where a vacancy occurs through the death of a practitioner on service. Definite arrangements have been made to meet such a contingency in some areas and should be made in all. Every assistance should be given in enabling the successor to practice to have such a fair start as will entitle the dependents on the practice to expect a fair price for it. The local practitioners should carry out the same procedure with regard to the successor as they had undertaken with regard to the man who has fallen while on service—namely, refuse to attend the patients of the practice, except in behalf of the successor, for a period of at least a year after the practice has been taken over.

13. In all cases of doubt as to what is the right course of action as regards an absentee, the practitioner should consider what he would like his neighbor to do if he were absent on military service. The Local Medical War Committee or the Central Medical War Committee will always be glad to advise.

It is probable that these recommendations will be regarded as a counsel of perfection. They have not escaped criticism. A somewhat cynical writer, embittered apparently by his unfortunate experience, has a letter in the *British Medical Journal* of December 2nd last. In particular he attacks rule No. 7 as fanciful and impracticable. He regards the rules as a whole as unworkable and in any case only applicable to three kinds of practice: a purely panel (health insurance) practice, a country practice with little opposition, and one in which the greater part of the income is derived from appointments.

The fact that, in a country where practices are fairly well defined and where the profession is united there, should still be, after

nearly three years of war so much difficulty in arriving at a satisfactory solution of this problem emphasizes its essential delicacy and difficulty.

No one will envy the county medical societies their task, but we believe that they will receive the loyal and self-sacrificing support of all conscientious physicians.

ANKLE SPRAINS.

A number of otherwise eligible and willing recruits have to be rejected for military service because of persisting weakness from old ankle sprains.

In such a case, when the acute stage of the lesion has passed, there is found to be more or less marked deformity, generally less rather than more. Relative movement of the bones of the ankle upon one another, in certain limited directions, causes pain. This is particularly the case with sudden movements, and occurs typically when the heel of a shoe catches on a stair tread or similar projection. The patient usually feels some discomfort on first using the foot in the morning. This, however, soon passes away with exercise, but, after any considerable amount of walking, it will return, accompanied by aching and not infrequently by edema.

The treatment usually applied in such cases is based on the generally accepted view of the pathology of the condition—namely, that the original lesion was overstretching, with rupture, partial or complete, of the ligamentous structures. Such treatment, as a rule, consists in massage, arch supports, ankle braces, etc. In a large number of cases it fails.

The fact mentioned above that this relative incompetence of an ankle joint is a fairly common condition, and is incompatible with military efficiency, renders highly topical and welcome an article on this subject by Dr. Cyriax published in the *Edinburgh Medical Journal* of March 17, 1917.

Cyriax shows that these chronic ankle cases are nearly always subluxations of the bones of the tarsus or of the cartilages separating them. And, what is more important and encouraging, he demonstrates that treatment based on this view of the pathology is successful in restoring the normal function of the foot, even in cases of some years standing.

The diagnosis of these conditions—that is to say, the differential diagnosis between the subluxation of a cartilage and that of a bone—may be effected by a careful comparison of the two feet, bearing in mind the normal anatomy of these parts. For the diagnosis of cartilage displacement the x-ray is not available, except as a process of exclusion. Fortunately, however, the majority of such cases may be recognized by the nature of the deformity discovered on palpa-

tion. The bony displacements reveal themselves on the x-ray plate, particularly when, as should always be the case, roentgenograms of the two feet are compared.

The treatment to be applied will vary with the situation and nature of the lesion, and it is unnecessary, in this place, to labor the details. To commence with, the foot is manipulated to render it supple and to open the joint in the appropriate direction. What that direction may be, is not difficult to determine because the direction movement in which course the most pain is opposite to that in which traction should be applied. Manipulations of the cartilage with or without vibration will sometimes effect replacement at one sitting, and the same is true of the bones. Relief is immediate and permanent.

Interest in these minor disabilities has been stimulated by the exigencies of war, and a great deal of valuable knowledge has resulted. This matter has more than a passing interest because we have here an exposition of the rational application of methods irrationally used by bonesetters in England and by certain cults in this country. There is an awakened interest in those methods employed by these people which have, as in the instance cited above, a reason for their existence, but it is necessary to remove them from the atmosphere of mystery or semi-magic which has been thrown around them by interested parties.

HISTORY JUSTIFIES UNCLE TOBY.

A correspondent, signing himself Tristram Shandy Junior, has been reading Birth Control literature of the theologico-medical controversialists and has, thereby, been reminded of the discussions which occurred just before the birth of his illustrious namesake.

It is not enough that these gentry pile bad pathology on worse statistics, and rest the whole on a precarious foundation of doubtful morality, in all of which respects the champions of both sides are equally guilty, but they must needs imitate the schoolmen in their bewildering futility.

They will discuss, with surprising heat and pedantry, whether it is more sinful to kill spermatozoon and ovum separately, or immediately after their union, and whether the ovum, unfertilized, is or is not a "living being."

Shades of Laurie Sterne!

The world has laughed at the gentle soul whose disconcerting and seemingly inconsequential exclamation put so abrupt an end to the discussions between his brother and the man-midwife, but, after six generations, History has repeated herself to show us that my Uncle Toby was talking horse-sense.

"I wish, Dr. Slop," quoth my Uncle Toby, "you had seen what prodigious armies we had in Flanders."

COLLECTIVE ABSTRACTS

A CRITICISM OF SOME THEORIES AND SOME FACTS CONCERNING CANCER.

BY MOYER S. FLEISHER, M. D., of the Editorial Staff.

It is interesting to note that since the experimental investigation of cancer has been developed within the last twenty years, few if any theories have been advanced regarding the cause of cancer by the men most intimately connected with this type of experimental work. On the other hand there has been no lack of willingness to advance theories on the part of medical men whose contact with malignant disease is purely clinical or even by individuals who are not associated with medical matters in any but an indirect manner. It is not our intent to state or suggest that men of this latter type are rushing in where angels fear to tread, nor that their temerity is due to a half knowledge, but it is unquestionably true that they do venture upon ground which has been carefully avoided by the investigator, probably because they lack the infinite patience which is bred in investigative work. They, like all interested in the problem of cancer, desire to have set forth a complete explanation of this baffling question, what is the cause of cancer? They have not the patience to wait until facts and more facts are brought to light, and until finally sufficient may have been brought together to warrant a complete theoretical exposition.

In some cases these writers base their explanations upon such facts as have been determined, results of experimental work or of statistical studies, in many cases the theories are only the exposition of personal conclusions frequently formed *a priori*, to which facts are attached, as a tail to the kite and twisted to follow the thought of the individual. In a few cases the theories are advanced only as abstract considerations and are not supported by any definite facts.

It is not fair to condemn these theories *in toto*, for they represent often the honest opinions of honest men, often they clothe in a new or different form certain facts which are generally accepted, and more often they set forth truths which are, however, only half truths. Too often the theories which are advanced, apparently, according to the belief of the writers, explaining completely the causation of cancer, do not truly explain or only partly explain the occurrence of cancer; the thought is incomplete and the writer has not realized the true depth of the problem.

There is, however, considerable interest in analysing some of the theories which have been advanced, and utilizing these theories as a basis for showing what facts do really bear upon the causation of cancer.

There has recently appeared in the English language a little book by the Hon. Rollo Russell entitled "Notes on the Causation of Cancer." Russell was not a medical man, but was an astronomer, a geologist and a humanitarian philosopher. His training was largely in scientific lines, and apparently the problem of cancer awakened his interest. He begins his considerations with the generally accepted facts regarding the influence of irritation on the causation of cancer; he soon, however, limits his consideration of irritation as a

cause of cancer, and we find him asking the question "where is the necessity for an intrinsic cause other than the nature of the human body, modified of course by habit and conditions, . . . why cannot we admit that the most probable causes of susceptibility are those irritants and toxins which civilized societies continuously and ignorantly absorb." Finally since foods are certainly irritant and since all individuals ingest larger or smaller quantities of irritant food substances, Russell lays his chief stress upon this factor as the cause of cancer. It is, according to his belief, the richer and more lavish diet of the more highly civilized races and of the wealthier classes that is largely responsible, but Russell also lays a large share of the blame at the door of the consumption of alcohol. While in the beginning of his monograph he is willing to admit that factors other than diet, or irritation may be of importance, he later ignores the existence of other factors or at the best glosses over the possible existence of other factors; he states "in the main, not in detail, the origin of cancer in the body is a rather simple thing, a transformation of ordinary tissue cells into different insurgent or hostile cells under the influence of prolonged stimulation or irritation."

Having settled upon the consideration of irritation as a cause of cancer, Russell very logically and quite exhaustively considers the effects of irritation first in plants and shows the relation of cankers, nodes and galls, etc., in plants to irritants. He explains the difference between these growths and the malignant and disseminating growths seen in animals as being due to the absence of a lymph-vascular system in the plants. While this may not be entirely incorrect, it must be borne in mind that one certain type of growth in plants, namely the crown gall, has been stated to be a true neoplasm, occurring in plants, and that this growth differs from those which Russell mentions in many qualities and characteristics, but it has been shown by Erwin Smith that this growth is due to a specific organism, the bacterium tumefaciens, and recently the same investigator has shown that certain chemical substances can produce early stages, at least, of conditions similar to those produced by the specific organism.

Erwin Smith does not claim that these tumescences produced by the chemicals are true neoplasms, nor that they possess the power of continued growth as a result of the single application of the chemical but suggests that the continued presence of a chemical, which exists in plants infected with the bacterium tumefaciens, might well lead to a continued growth and the development of a true neoplasm. There is a wide divergence between this idea of an irritant producing tumor growth and that advanced by Russell.

In considering tumors or cancers in animals, Russell briefly mentions the views of a few individuals who have found parasites associated with tumors in animals, views not generally and widely accepted and based upon a somewhat limited number of observations.

He begins his consideration of cancer in humans with the generally accepted examples of irritation as causes of cancer, such as soot, the kangri basket, betel-nut, the pipe, radium, the x-ray and the other well known irritants. Passing from these he proceeds to consider causes of irritation within the body.

Among the internal causes of irritation he mentions alcohol, tea and coffee, excess in food, condiments, sour articles of food, very hot food or drink, putrefying food and finally parasites.

At this point Russell brings a comparative study of statistics into the discussion to support his theory that these ingested irritants are the most important causes of cancer. Aside from the fact that statistics are often deceptive, and granting even that ingested substances may act as irritants and be factors in the causation of cancer, it is evident that in his enthusiasm Russell has dropped from consideration all other irritant factors except the internal

ones. Furthermore, it is evident that Russell in stating cancer rates in different countries or communities has included all types of cancer, that is, considers the total cancer rates without regard to site of origin or type of the cancer. He has fallen into the very common habit of a man who sets out to prove his point with the aid of statistics, and, while his arguments and facts appear to be supporting his claims, there is a lack of complete and thorough analysis, which might well destroy entirely the structure of his argument.

He fails also to discriminate between those countries where cancer statistics are carefully and thoroughly recorded, and those countries where we have only a limited and somewhat unreliable knowledge. It has certainly been shown when careful investigations are carried out to determine the cancer mortality among less civilized races that the statement that they suffer less from cancer than do the civilized races has not been sustained by the facts.

He furthermore compares certain districts within various countries and states without complete analysis that the wealth or the general character of the food of the people in these districts, will suffice to explain the higher mortality from cancer found in that section.

While we probably can not state that the ingestion of irritant foods or the constant ingestion of too large quantities may not be a possible cause of cancer, and although it is quite probable that it may in certain cases be a factor in the etiology, it certainly does not appear to be justifiable to state that diet is the most important factor in the causation of cancer. Russell, therefore, has set forth a theory which can not be denied in its entirety, he has apparently made the mistake of allowing himself to be carried away by a hobby with the result that his reasoning and arguments are faulty.

A very different point of view and a very different handling of the subject of the etiology of cancer is that advanced by C. Mansell Moullin in his booklet "The Biology of Tumors." While it is based upon cellular theory backed with the histological examination of tissues and references to experimental work, it is, like so many theories, but an incomplete explanation, and fails to plumb the true depths of the problem.

Moullin divides tumors into two classes; the first due to the power of the tissues, "in virtue of which they give birth to buds that grow into tumors"; and second those tumors which "arise from details of structure which are not carried out as they ought to be."

In connection with the first class he states that the structure of the tumor is due to the parent stem—a fact with which no pathologist will quarrel. The rate of growth depends according to his ideas upon the maturity of the parent cell at the moment the tumor bud was given off, and the degree of the organization of the tumor upon the stage in the life history of the race which the parent cell had reached when its development was arrested. These two latter statements are not generally accepted and are not borne out by experimental facts. Certainly tumors arising from definitely differentiated tissues may show an atavistic tendency, or may depart from the type of organization shown by the parent tissues. Furthermore, it would appear from Moullin's statements that he believes that tumors arise from single cells, and this statement cannot be supported by definite facts or observations. It is quite as likely that a tumor may arise from a group of cells as from a single cell.

He differentiates between tumors which take on a malignant character and tumors which remain benign; the former he believes arise from tissues which have not passed beyond the embryonic stage of life, and which therefore "retain the power of multiplying with all the energy of embryonic cells and of spreading into and invading everything around." Certainly the facts which have been brought to light in connection with the growth of adult tissues in various media, outside of the body, have demonstrated the power of adult tissue

to take on the same powers of unlimited growth as embryonic tissue. There can be no sharp differentiation between the potential activities of embryonic and adult tissue.

As the prime cause which leads to the production of a tumor from normal tissue, Moullin upholds the possibility that some restraining factor may be removed or that a stimulus acts to rouse the cell into activity, or that probably these two factors work together. These explanations do not explain; there are words to cover vast lack of knowledge, not knowledge that Moullin lacks, but knowledge that the world lacks.

As the restraining cause, development is advanced; "so long as development continues as it should, work is done properly, growth and reproduction never break bounds, and tissues never give birth to the irregular structures known as tumors. If the influence of development is removed, control over growth and reproduction is lost." Further on Moullin states "anything that interferes with the inheritance of the products of past chemical changes, or with the effects of present ones, interferes with and checks or stops, the advance of development." If we analyse or try to analyse these statements, if we try to search the true depths of the meanings of the sentences, do we arrive anywhere, or are we not left just as much in the dark as to the true causation of cancer as we were when we began? Are we not simply fooling ourselves if we believe or try to believe that we have here an explanation of the cause of cancer? We may have nicked the surface but we would be simply covering ignorance with words.

Moullin gives very little space to the consideration of the second type of tumors, those due to the failure to carry out perfectly structural details. Among these he classes cysts arising from the hyolingual, Mullerian and Wolffian ducts.

While we have used these two booklets to develop criticisms which may be raised against theories regarding the origin of cancer, it is only just to state that similar and more severe criticisms can be raised against theories advanced by others, not only at the present time but from time immemorial. The reason that such theories are open to criticism, is due to the fact that our knowledge is at the present time imperfect, and many facts must be added before we are justified in theorizing. Furthermore the majority of theorists have lost sight of the fact that the problem of cancer is intimately bound up with the problem of cell growth, and they ignore our rather limited knowledge in this field.

We can, however, state that certain isolated facts bearing upon the etiology of cancer have been brought forward within the last few years; facts, however, upon which we cannot as yet base any definite theory, and it is not the intention of the reviewer to do more than to point out these facts.

We may divide the facts into three classes, those which bear upon the relation of external irritants to cancer, those which bear upon the relation of internal factors, and finally those which have to do with the heredity of cancer.

Regarding the relation of external mechanical irritants to cancer, there has been but little added to our knowledge in the past few years. The relationship of parasites to cancer has, however, received very definite support as the result of the investigations of Rous and his coworkers into the cause of several transplantable tumors of the chicken. Their demonstration of the fact that these tumors could be transmitted from animal to animal by the cell free filtrate obtained from this tumor, leaves only the possibility that some organism acts in this case. Some possible further support of the parasitic origin of tumors has been added by the investigations of Erwin Smith on the crown gall in plants; while as stated above it has not been definitely accepted that this tumor of plants is identical with cancers in animals, it is certain that in

many points the crown gall has qualities similar to tumors of animals,—it apparently metastasizes by the transportation of cells from one part to another and it seems to destroy the tissues in its vicinity. Erwin Smith has shown that this tumor is due to a specific organism. He goes not, however, affirm dogmatically that the crown gall is analogous to tumors in humans, although he advances this claim very strongly. And he definitely states that there is no reason to believe that the organism producing crown gall—the bacterium *tumefaciens*—has any relation whatsoever to human cancer.

Even with these facts before us it is not justifiable to state or even to consider that all tumors arise as a result of the invasion of tissues or cells by organisms; we must accept these results simply as isolated facts, for it is quite as important to realize the limitation of the interpretations of results as it is to see the possibility of constructive theorizing.

The influence of internal factors upon the production of cancers is not so readily studied as are some of the other problems regarding cancer. The most important studies in this field were carried out some years ago by Leo Loeb in the investigation of the development of artificially produced tumors of the uterus of guinea pigs and rabbits. He showed that the ovary and specifically the corpora lutea secreted a substance which was required for the production of these tumors. These tumors did not occur normally in these animals and they were only transient in character. Since, however, the internal secretions of the body which acted in the case of the corpora lutea only temporarily had so marked an influence upon tissues stimulated by a single mechanical trauma, it appears quite likely that internal secretions acting upon tissues over a longer period of time and associated with the continued action of a mechanical irritant might lead to sufficient stimulation of tissue to produce a true tumor, either benign or malignant.

In the field of heredity there has been a considerable accumulation of facts, chiefly as a result of the systematic studies of both Leo Loeb and Maude Slye. Here the investigations have not yet been carried far enough to state exactly what part heredity plays in the production of cancer. We can, however, draw the conclusion that heredity does play a part in the development of cancer in mice; that certain mice of a common ancestry are distinctly more liable to develop cancer than are other mice of a somewhat different ancestry. The manner in which this hereditary tendency is transmitted, and the laws which it follows are not as yet clear, nor can we definitely state that this quality of cancerous tendency is transmitted as a dominant quality, when we interbreed mice of low and high tumor rates.

Loeb believes from his investigations that the combination of hereditary factors and internal secretions is of great importance in the causation of cancer, but does not of course intimate that external causes of various kinds do not play a part in many cases. Slye believes that heredity supplemented by external factors will serve to explain most cases of the appearance of cancer.

It must be borne in mind that these investigations regarding the influence of heredity of cancer have been carried out chiefly in mice and while it may be possible to apply the results directly to humans, we are scarcely justified in doing so without further investigation.

Even with these facts presented above we must still bear in mind the fact that ultimately the problem of cancer is bound up with the problem of cell growth. We must discover why a normal cell takes on the type of growth which it shows as a cancer cell; as in all problems, we must base our knowledge of the abnormal upon the facts of the normal. The problem of cancer growth therefore goes down finally to the problem of normal cell growth.

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WHOOPIING COUGH—A REVIEW OF RECENT LITERATURE

BY A. FRIEDLANDER, M. D., of the Editorial Staff.

The March number of *Health News*, the monthly bulletin of the New York State Department of Health, contains a reliable and interesting presentation of the subject of Whooping Cough. The first article, by Dr. Anna W. Williams, emphasizes the contagiousness of pertussis and urges the adoption of the methods of personal decency in preventing the spread of the disease. Isolation and quarantine of suspicious coughs in schools is suggested. Whooping Cough vaccine is strongly recommended both for prophylaxis and treatment. Dr. Henry L. K. Shaw, director of the Division of Child Hygiene of New York State Department of Health, in an article on the treatment of whooping cough, states that the value of vaccines as a prophylactic is undeniable and urges that they be administered to every child exposed to whooping cough. The New York State laboratory is prepared to furnish vaccines made from pure cultures of the Bordet-Gengou bacillus.

Abt in the December number of the *Archives of Pediatrics* reviews the whole subject of Whooping Cough and discusses the difficulties of prevention under the following heads:

1. The disease is infectious in the early stages.
2. The disease presents so few symptoms at the onset that diagnosis can be positively made only after a lapse of considerable time, when definite symptoms occur.
3. On account of the mildness or atypical symptoms the true nature of the disease sometimes remains unrecognized during the entire course.
4. In spite of an evident diagnosis the children are sometimes sent to school.
5. Convalescents are sometimes admitted to their classes before the contagiousness of the disease has disappeared.

Luttinger in the *American Journal of the Diseases of Children*, September, 1916, would reduce morbidity and mortality of the disease by

1. Education of the private physician as to the prevalence and fatality of the disease and the securing of his cooperation in reporting all pertussis cases and in using the specific vaccines, wherever practicable, as a prophylactic and in early cases.
2. The education of the laity through physicians, nurses, leaflets, etc.
3. Regulation of moving-picture shows and other public meeting places, which should as far as possible, exclude children with paroxysmal coughs.
4. Quarantine of pertussis cases during the first two weeks of the disease.
5. The establishment of more whooping cough clinics, at least one in each borough.
6. The organization of a boat camp for the rational treatment of pertussis, especially during the summer time, should be carefully considered.
7. The use of a suitably constructed pertussis hospital, in which the care of the patients with severe attacks of whooping cough could be more efficiently undertaken and which would afford an opportunity for further scientific research on laboratory as well as clinical lines.

Morse in the *Boston Medical and Surgical Journal*, November 16, 1916, also discusses measures to be taken for the control and prevention of whooping cough.

Tissier in the *Bulletin de l'Académie de Médecine*, Paris, June, 1916, describes an epidemic in Paris affecting adults as well as children.

Cheivitz, *Ugesk. f. Laeger*, August 24, 1916, confirms the etiologic importance of the Bordet-Gengou bacillus in Whooping Cough.

Povitzky and Worth in the *Archives of Internal Medicine*, February, 1916, studied the agglutination tests in pertussis in regard to their characteristics and comparative value in clinical diagnosis and the determination of genus and species.

Olmstead and Povitzky in the *Journal of Medical Research*, of Boston, January, 1916, report a study of the complement fixation reactions of the Bordet-Gengou bacillus.

Graham in the *Journal of the American Medical Association*, October 28, 1916, in a study of the death rate in acute infections in Philadelphia for a five-year period, shows that whooping cough is responsible among infants for more deaths than measles, diphtheria and scarlet fever together. While not as fatal after the first year, pertussis even then shows a high mortality rate and, between two and five years of age, causes almost as many deaths as under two years of age. The mortality decreases steadily after the fifth year, until the tenth year when it causes practically no mortality. The mortality during this period from 1911-1915 was slightly less than 7 per 100,000.

In an announcement with reference to mortality in 1915 by the Bureau of Census, Whooping Cough is shown to have a death rate of 8.1, somewhat above the lowest recorded rate for this disease 6.5 in 1904 although far below the highest 15.8 in 1903.

Henry Chalmers in a statistical study of whooping cough in New York State, *Health News*, March, 1917, stated the death rate to be 7.6 per hundred thousand. His figures showed that females have a decidedly higher rate of mortality than males, probably owing to the difference in the formation and development of the larynx. In his summary he urges the necessity of popular education as to its dangers and medical attention to its early recognition and effective isolation and treatment.

Benstz, *Nederlandsch Tijdschrift voor Geneeskunde*, Amsterdam, January, 1916, tabulates the findings in the blood of 63 cases of whooping cough from one to six years of age.

Depping, *U. S. Naval Bulletin*, April, 1916, reports two cases of intussusception as interesting sequelae to Whooping Cough. Among the many new methods of treatment advocated are the reports of Ebstein in *Munchener medizinische Wochenschrift*,¹⁵ Munich, January, 1916, on diathermia of the larynx, and Melfi, *Semana Medica*, March, 1916, Buenos Aires,¹⁶ on the treatment of whooping cough by subcutaneous injections of extract of patient's sputum. Polozker, *American Journal Obstetrics and Diseases of Women and Children* (March, 1916), reports that vaccine has given him the best results in a series of 100 cases treated with various methods. Paranhos, *Brazil Medical*, September 30, 1916, also discusses the vaccine therapy of pertussis. Biefeld in a resume on infectious diseases in the *American Journal Diseases of Children*, August, 1916, concludes the further use of vaccines is definitely indicated for treatment and prophylaxis. The investigation of the New York City Department of Health described by Williams, *Health News*, March, 1917, shows the value of pertussis vaccine over other methods of treatment especially when given early. After the third week of the whoop the course of the disease seems little influenced by the vaccine.

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REVIEW OF THE BLOOD FINDINGS IN PURPURA AND HEMOPHILIA.

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The theoretical and practical interest in the blood findings in cases of purpura in its various types and in hemophilia is evidenced by the number of articles that have recently appeared in various scientific and clinical periodicals. The present review will include only such material as bears on blood changes in these two conditions.

PURPURA, whether it be considered a disease or symptom, is characterized by the phenomena of spontaneous hemorrhages developing in and beneath the skin and mucous membranes. The condition is common to the second decade of life. Purpura simplex and purpura rheumatica occur more frequently in the male, especially near the time of puberty, while women are more disposed than men to purpura hemorrhagica.

The direct cause of purpura is unknown. Neither is it known whether the red cells leave the vessels by diapedesis or rhexis. A few writers have contended that the hemorrhage is the direct result of pathological conditions of the vessels proper. Clinicians have, however, objected to the theory of primary vascular degeneration as a cause of primary purpura hemorrhagica for the reason that the hemorrhages are widely distributed over the surface of the body and often develop with great rapidity. Such a generalized and speedy alteration of the vessels has seemed improbable. Furthermore, the tendency to hemorrhage is transitory. Hence it is difficult to reconcile the clinical picture of a severe, rapidly developing disease of short duration with a serious disease of the vessels.

If purpura is due to an endarteritis and hyaline degeneration of the vessels, one would justly expect that the hemorrhage would continue indefinitely (Pratt)⁵⁰.

Flexner found that animals subjected to an injection of snake venom developed multiple hemorrhages in a few minutes, the hemorrhage being due to the action of a constituent of the venom—hemorrhagin—which apparently attacked and destroyed the vascular endothelium. Studies on anaphylaxis have shown that hemorrhages occur with extraordinary rapidity, and focal changes with hemorrhage have occurred in so short a time as four minutes, changes in the endothelium of the capillaries being held responsible for at least part of the hemorrhage. These and other considerations have suggested that in purpura there may be a substance in the blood which produces endotheliolysis with focal hemorrhage; hence we may tentatively assume that purpura is a pathological condition of the blood.

Sahli states that it is impossible to draw a characteristic blood picture for this disease, since, even if one excludes cases where the symptom complex purpura develops from a well-recognized malady, the diseases accompanied by purpuric symptoms show no agreement in their etiology. Nägeli also failed to demonstrate any striking morphological changes of the blood in this condition.

In the majority of the cases studied by Pratt⁵⁰ the blood coagulated within the normal time. In thirty-four cases of idiopathic purpura in which the

coagulability of the blood was determined gave an average time of five and one-half minutes. With the Brodie, Russell's method of determining the coagulation time, Hinman and Sladen²⁰ demonstrated that records below seven to eight minutes were normal. These and allied cases would indicate that there is no marked deficiency in the thrombin or its antecedents, thrombogen or thrombokinase.

A normal blood clot rapidly contracts and extrudes the serum. Hayem¹⁷ asserts that in purpura hemorrhagica the clot does not retract, and there is no extrusion of serum. He also found that a clot formed from normal blood freed from its platelets failed to contract; hence contraction of the clot was ascribed to the presence of platelets. Le Sourd and Pagniez,³² 1907, state that the failure of the clot to contract has been observed when the number of platelets is increased. They attribute, however, contractibility of the clot to the platelets. This property of the platelets is thermolabile, is injured at 45° to 50° and destroyed at 58° C. A serum that destroys blood platelets can be obtained by injecting blood platelets from rabbits into guinea pigs. Such serums check the contraction of the clot and, if introduced into the circulation of a living animal, reduces the number of platelets, and renders the blood clot less contractile. Clotting occurs in cases of purpura with severe hemorrhage, although the clots are often less firm than normal. This lack of contractibility of the clot suggests the possibility of decreased fibrinogen or that there is an increased fibrinolysis, or that the absence of platelets makes impossible a complete clot reaction because of a deficient or lacking constituent normally possessed by the platelets.

The most characteristic and constant blood finding in purpura is the low count or absence of platelets. Denys⁴⁵ recorded an almost complete absence of blood platelets in a case of purpura hemorrhagica. Hayem¹⁷ recorded an instance of low platelet count and published observations made on three cases, all of which gave a greatly diminished platelet count. Ehrlich¹¹ also found a decreased platelet count in a case of purpura hemorrhagica. Pratt⁴⁹ in 1905 devised a method for enumerating the platelets, and he found in seven cases that the platelets were almost absent. In healthy individuals, according to his count, the number of platelets is practically one-half million. He also made the interesting and significant finding that a sudden diminution in the number of the blood platelets preceded a profuse hemorrhage in a case of severe symptomatic purpura occurring in chronic nephritis.

Coe⁵ in 1906 reported five severe cases of hemorrhagic diathesis, the extremely low count of blood platelets being the one constant finding. From his study of these cases he concluded that there was a close relationship between liability to hemorrhage and the number of blood platelets. In one patient, forty-eight hours before bleeding began, there was a sudden disappearance of platelets from stained films. A low platelet count is maintained throughout purpuric conditions, and may be entirely absent or greatly diminished during attacks of hemorrhage. In simple purpuras the platelet count may be only slightly lowered or normal.

Experimental efforts have been made to elicit the appearance of purpura and reduction of platelets in laboratory animals. Gley,¹⁵ 1896, found that the injection of albumose into the circulation greatly diminished the number of platelets. Krehl and Pratt²⁷ have made similar observations. Howell²⁴ states that the introduction of peptone into the blood stream greatly lengthens the clotting time. Musser and Krumbhaar,⁴⁰ 1916, endeavor to produce purpura by the use of benzol as suggested by Selling,⁵⁵ and diphtheria toxin as evidenced by the work of Duke.⁹ Their efforts were, however, not successful. None of their animals so treated demonstrated any change in the number of platelets during life. Ledingham,³¹ in conforming the work of Le Sourd and

Pagniez,³³ formulated a method of producing purpura experimentally by the use of a so-called antiplatelet immune serum. Musser and Krumbhaar,⁴⁰ following Lee's²⁹ modification of Ledingham's³¹ method—i. e., the injection of a saline emulsion of essentially pure platelets of two guinea pigs into a rabbit four times at intervals of seven days, the animals being killed at the end of one week after the last injection—were able to produce purpura in every guinea pig into which the serum was injected. The hematologic examination showed evidence of anemia and leucocytic increase and decreased count of blood platelets. Injection of normal rabbit serum failed to cause any signs of purpura. They also found with purpura experimentally produced that there was a very definite lowering of the resistance of the erythrocytes to hypotonic saline solutions. Musser³⁹ in 1914 drew attention to the fact that in acute hemorrhagic dyscrasia when purpura was present a decrease in the resistance of the red blood cells to hypotonic saline solutions frequently occurred. Their findings are significant in that they show that alterations occur not only in the platelets, but also in the red cells themselves. It is interesting to note that the antiplatelets serum used by Musser was hemolytic in action and also caused varying degrees of agglutination. Musser states that it is difficult to determine just how great a part the hemolytic property of the serum plays in causing purpura, and inclines to the view that the hemolytic action is an inherent property of antiplatelet serum common to all cytolytic immune serum; for a specific hemolytic serum does not ordinarily possess the power of causing purpura (Pearce,⁴⁶ Bunting,⁴ Wells⁵⁶). They believe, therefore, that the hemolytic factor is a characteristic of the antiplatelet element of the serum, and in part at least is responsible for the production of purpura. The suggestion naturally follows that the pathogenesis of purpura may be dependent on a substance which destroys the platelets, at the same time decreasing the resistance of the erythrocytes. Through the decrease of platelets thus caused would result a loss of thrombogenic substance and the characteristic prolongation of bleeding time; *but the real basis of the pathogenesis of purpura would be the hemolytic substance, which destroys the plates and weakens the red cells.* Further work along this line is needed, and it seems that data on washed corpuscles might add additional light to the action of hemolytic and platelet destroying agents.

HEMOPHILIA, "the most hereditary of the hereditary diseases," is a constitutional anomaly characterized by severe and often uncontrollable hemorrhages which arise spontaneously or from trivial trauma. Hemophilia was first described as a clinical entity by an American physician, Otto.⁴³ A thorough review of early American works on this subject are to be found in the articles of Dunn¹⁰ and Osler.⁴⁵ Hemophilia is rare in persons whose family history is free from bleeders. It usually occurs in large numbers in the same family and usually attacks the male. Early students of the malady were inclined to attribute the course of this condition to changes in the blood vessels. Recent works, however, tend to show that the cause of hemophilia may be ascribed with certainty to an abnormality in one of the factors of coagulation, and that the hemophilic condition is characterized by certain reactions which distinguish it from other hemorrhagic diseases.

The explanations offered for the causation of hemophilia vary as to the theory of coagulation adopted. According to the views of Morawitz,³⁷ and Fuld and Spiro,¹⁴ only four possible factors need be considered. The essential feature of this theory is the activation of thrombin, which, they contend, results from prothrombin by the combined activity of calcium and a substance designated as thrombokinase. If one accepts the theory of Howell,²⁴ there are five factors which enter into the formation of a clot—prothrombin, anti-thrombin, thromboplastin, fibrinogen, and calcium. All of these elements, ex-

cept thromboplastin, are present in the circulating blood. Intravascular clotting is prevented by the combination of prothrombin with antithrombin. When blood is shed, the antithrombin is neutralized by the thromboplastic substances of tissue juices. The liberated prothrombin is now activated by calcium, and the thrombin which results converts soluble fibrinogen into the insoluble fibrin or clot. The existence of antithrombin in the circulating blood is admitted by Morawitz, but is not regarded by him as an essential part of the process.

The hemophilic condition is distinguished by the greatly prolonged coagulation time of the blood when removed from the vessels. Recent workers are agreed that this defect in coagulation is a constant pathological sign of the disease, but various explanations have been given by different workers to account for the delayed coagulability.

There are no characteristic blood pressure changes in hemophilia. The number of leucocytes are often diminished. The polynuclear cells are both relatively and absolutely diminished and the lymphocytes are relatively increased (Sahli^{52 53} and Wright). More recent studies have, however, shown that in typical cases of hemophilia the numerical counts of the formed blood, the erythrocytes, and the leucocytes are within normal limits.

Hayem,⁴⁷ Sahli, Morawitz, and Lossen³⁸ state that the blood platelets are not diminished—they may be increased. Hayem also states that the retraction of the blood clot and extrusion of serum are normal, while in purpura the reverse is true. Hence in typical cases it has been shown that certain active principles of the blood that participate in clotting occur in normal amounts.

Sahli^{51 52 53} made the interesting and important observation that coagulation might be normal, or even accelerated, in typical cases of hemophilia while hemorrhage was in progress and greatly delayed during intervals between bleeding.

Pratt⁴⁷ in his studies of blood coagulation found that a second drop of blood obtained from a cut after the first drop had coagulated always coagulated more rapidly than the first. The lack of consideration of this point, no doubt, has been a frequent source of error in examinations of the coagulation time in diseases of the blood; hence the older works are to be considered with some reservation. A. E. Wright⁵⁶ found the coagulation time retarded in hemophilia, in one case, forty-five minutes and in a second case over an hour.

Fonio,¹³ Addis,¹ and Gressot¹⁶ have shown that the hemophilic blood serum contains the normal amount of thrombin—the active coagulating principle—and that this thrombin behaves in an entirely normal fashion. It has also been clearly shown that the hemophilic blood clot, when once formed, is as tough and firm as normal and retracts in normal fashion.

Hurwitz and Lucas²⁶ have shown that there is no alteration in the reaction of hemophilic blood, and that there is no abnormality in the third phase of coagulation. Clot formation is slow, but the clot, once formed, shows normal retractile power. They have further shown that the percentage of serum albumin, serum globulin, and total protein of hemophilic serum do not show wide variations from the normal. The fibrinogen and calcium are considered to be within normal limits. Weil⁵¹ offers experimental evidence that an excess of antithrombin occurs in hemophilic blood. Howell²³ was not able, however, to find that his antithrombin was notably increased. The studies of Hurwitz and Lucas,²⁶ Hess,¹⁹ and Minot and Lee³⁴ confirm Howell's findings in regard to antithrombin.

Sahli,^{52 53} Marawitz, and Lossen³⁸ attribute the faulty coagulation to a defective or insufficiency in the thromboplastic (thrombokinas) substance.

Nolf and Herry⁴¹ believe that there is a quantitative or qualitative deficiency in the thrombozyme, which occurs in the blood platelets in circulating blood in contrast to similar factors in the tissues. Addis¹ holds that the abnormality

of hemophilic blood is due to altered properties in the prothrombin—i. e., it is altered in character so that it requires a longer time than normal for its activation to thrombin. Howell,²³ on the other hand, concludes that it is the actual amount of prothrombin that is altered in the hemophilic blood, and believes that it is the deficiency in amount of prothrombin, with the resulting relative excess of antithrombin, that is responsible for the abnormally long coagulation time. He does not, however, deny that the platelets share in this deficiency.

Ponio^{12 13} believes that the active coagulating principle in the tissues, while similar, is not identical with that of the blood platelets, and is inclined to attribute the delayed coagulation in hemophilia to an insufficiency of thrombozyme or blood platelets which are present in sufficient amounts. Sahli^{52 53} demonstrated similar differences with hemophilic and normal blood cells as Fonio did with platelets. His results may have been due to platelets contained in his red cell suspensions.

Duke⁹ has shown that the time a patient bleeds from a puncture of the ear is prolonged in conditions with very few platelets. In such conditions, however, the coagulation time is often normal, although it may be delayed slightly. Probably it takes few normal platelets to do their share in causing blood to coagulate in normal time, and that a little thrombin suffices to cause clotting of fibrinogen, though weakly, in the same time as much larger amounts. With minimal amounts of thrombin the time is delayed and the clot is weak.

Duke,⁹ Hess,¹⁰ Minot and Lee³⁴ have found the bleeding time normal in hemophilia. It seems strange that typical cases of hemophilia in which bleeding occurs readily after injuries, and which show a marked delay in coagulation time of the blood, do not always have an abnormal bleeding time.

Minot and Lee³⁴ give an excellent summary of previous work, and from this and their own work on the blood platelets from two typical cases of hemophilia draw the following conclusions concerning the properties of blood: In typical hemophilia the formed elements are in essentially normal numbers. The calcium⁵⁰ and fibrinogen content of the blood and thrombin in the serum are within normal limits. The antithrombin is normal or slightly increased. The activity of the tissue juices is probably normal, while the prothrombin time is markedly delayed.

If normal blood platelets in about normal amounts are added to hemophilic plasma, they cause it to coagulate in a time that is normal or nearly so. When hemophilic blood platelets are, however, added in approximately seventy-five times as great a concentration as in normal blood, though they definitely shortened the coagulation time, they never brought that time to anything approaching normal limits.

By the use of the method of formation of thrombin described by Bordet and Delange, the blood platelets require more time to form thrombin when derived from hemophilic than from normal blood, this being consistent with the reclothing phenomenon observed in hemophilic bloods.

Hess¹⁰ gives the following differentiation between purpura and hemophilia. The picture of a typical hemophiliac is a male, with a hereditary history of bleeding, whose blood manifests a definite delay in coagulation time, whose platelets are normal in number, "bleeding time" not increased, who shows no hemorrhagic reaction following subcutaneous puncture of the skin, and a negative capillary resistance.

A typical case of purpura is quite different. The patient may be a male or a female, the plasma coagulates in almost normal time and the number of blood platelets is decreased (frequently below 100,000 in number), there is definite subcutaneous hemorrhage following puncture of the skin, and increase of the bleeding time, and the development of petechial hemorrhage following the application of a tourniquet.

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ORIGINAL ARTICLES.

NEW ASPECTS OF THE SIGNIFICANCE OF APPETITE AND APPETITE GASTRIC JUICE IN PRACTICAL MEDICINE.*

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In his classical work on the physiology of the stomach and stomach secretions, Pavlov complained that the physicians of that day neglected the element of appetite in digestion and nutrition, and the work of this eminent Russian physiologist has led to the general conclusion that appetite is of importance in digestion and nutrition essentially because it leads to an abundant secretion of gastric juice, the so-called appetite or psychic gastric juice. The reader may recall some of Pavlov's classical experiments in this direction. He and his co-worker showed, in dogs, that seeing, smelling, and particularly tasting of palatable food resulted on the part of the hungry dog in secretion of gastric juice of the highest acidity and pepsin concentration. In fact, Pavlov states: "No other stimuli to gastric secretion can compare, so far as quantity and quality of the juice is concerned with the desire for food."

Pavlov put pieces of meat through a gastric fistula into the empty stomach of sleeping dogs, that is, in conditions when no appetite gastric juice was evoked by the sight, smell, or taste of food, and he noted that such pieces of meat remained for hours in the empty stomach with little or no digestion. When similar pieces of meat were put into the empty stomach of a dog when he was awake and saw the meat, prompt digestion resulted. In fact Pavlov places the greatest emphasis on the appetite gastric juice as the necessary initiation of gastric digestion. The chemical action of this initiative stage of gastric digestion of proteins yields the secretagogues which stimulate the production of gastric juice to complete protein digestion so far as this occurs in the stomach.

Pavlov assumes that there may even be pathologic states in man in which the gastric glands are incapable of responding to the chemical secretagogues in the stomach but the stomach may still be able to produce appetite gastric juice by means of the reflexaction from the mouth.

This view of Pavlov's school is generally accepted by physiologists

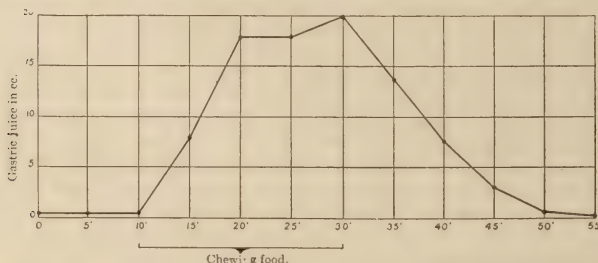
*From the Hull Physiological Laboratory.

and clinicians the world over. The absence or loss of appetite gastric juice must on this view be a serious factor. Curiously enough, Pavlov and his earlier pupils overlooked or failed to discover or recognize the importance of the continuous secretion of gastric juice in the empty stomach of a normal man or animal in the absence of food in the stomach, and in the absence of all known psychic or reflex factors. Readers who are familiar with Pavlov's work will recall how he emphasized again and again that, in the absence of food in the stomach and in the absence of psychic factors of appetite, that is, seeing, tasting or smelling food, not a drop of gastric juice flows from the little stomach pouch of his dogs. This view is erroneous. So far as my experience goes, and this experience includes observations on many hundreds of dogs, and from 75 to 100 normal persons, secretion of gastric juice by the empty stomach in the total absence of food or appetite factors is almost invariably the rule. This secretion rate in normal persons varies from a few cubic centimeters to as high as 125 cubic centimeters per hour. The higher the rate of this continuous secretion the nearer does the product approach in composition the full acidity and pepsin concentration of pure appetite gastric juice. I would like to remark that the secretion rate in the empty stomach of as much as 125 cubic centimeters per hour is apt to be regarded by the physician as a hypersecretion, in other words, a pathologic phenomenon. But in the persons under my observation there was absolutely no evidence of any gastrointestinal disorders or other pathologic conditions in any part of the body. This continuous secretion is usually present also in normal dogs, although a number of years ago the Russian physiologist, Boldyreff claimed that it appeared only after three or four days complete starvation.

The cause of the continuous secretion is unknown. We have for a number of years had the opportunity of studying appetite gastric juice and the secretion of appetite gastric juice in a normal person with a permanent gastric fistula and complete occlusion of the esophagus of over twenty years' standing. The stricture of the esophagus occurred as a result of corrosion with alkalis when the man was a lad of seven years of age. He masticates his food in the usual way and puts it into the stomach by means of a rubber tube permanently fixed in the gastrostomy. So that when the stomach is empty and the man has an appetite, all we have to do is to remove the cork in the rubber tube leading into the stomach and let the pure appetite juice flow out when he masticates his meals in the ordinary way. Thus we can study under very accurate conditions the rate of secretion of appetite gastric juice, its chemical constitution and the various conditions that influence the appetite secretion. Hundreds of observations have been made on this and other points and much of the data obtained corroborate the results of observations on the

secretion collected from a gastric fistula (also in a normal person) as well as from other normal persons by using the Rehfus tube.

In our fistula man we find that the average rate of secretion of appetite gastric juice is $3\frac{1}{2}$ cubic centimeters per minute. The maximum rate of secretion that we have observed during mastication of the meal is 11 cubic centimeters per minute; the lowest $1\frac{1}{2}$ cubic centimeters per minute. Chewing the food without appetite causes no secretion of gastric juice whatever. In man, seeing, smelling or thinking of food, when hungry has a very slight influence on the continuous secretion of gastric juice. In this respect man appears to differ from dogs, as studied by Pavlov. In man, the all important factor for the appetite secretion is the tasting or the chewing of the palatable food. The secretion starts practically without any latent period as soon as the person starts to chew, and it begins to slow up practically at once when the mouth is free from food, so that 15 to 20 minutes after chewing the food the appetite



Typical curve of secretion of gastric juice of Mr. V. on mastication of palatable food for twenty minutes. The gastric juice was collected at five-minute intervals. The rise in the secretion rate during the last five minutes of mastication is due to chewing the dessert (fruit).

secretion factor is at an end. A typical curve of appetite secretion of gastric juice in man is reproduced in Fig. 1. This appetite gastric juice in normal persons is of a very constant composition. The total acidity is practically $\frac{1}{2}$ percent, or the same as in a normal dog.

I should like to point out in this connection that the acidity of this pure gastric juice from the stomach of normal persons is equal to to the highest degree of acidity of the gastric juice so far recorded in the literature in cases of so-called clinical hyperacidity. Impressed with the view of Pavlov that the loss of the appetite gastric juice would result in some degree of gastric indigestion, I was very careful, in the earlier experiments on the fistula case, not to remove all of the appetite gastric juice from the stomach before he put in his food, but occasionally all of the appetite juice was, nevertheless, removed and I took particular notice whether this led to any demon-

strable indigestion. To my surprise it did not lead to indigestion, and so I instituted a long series of observations, different kinds of food making up the meal, and removing all of the appetite gastric juice secreted as a result of his masticating the food. There was no delay in the emptying of the stomach, no gastric indigestion, no digestive disorders of any kind resulted.

This being the case I was naturally led to question the universally accepted conclusion of Pavlov, namely the paramount importance of the appetite gastric juice as the necessary initiative of normal gastric digestion. It is, of course, well known that if a person eats unpalatable food or if a person compels himself or is compelled to eat even palatable food, when there is no appetite, or desire for food, gastric indigestion usually results. This well-known fact undoubtedly paved the way for the universal acceptance of Pavlov's interpretation of the significance of appetite gastric juice. But another equally important fact is also being gradually recognized both by the clinician and physiologist, that is, we may have achlorhydria, or complete absence of hydrochloric acid, and possibly of pepsin, in gastric juice without any digestive disorders, and certainly without any gastric indigestion. Some of these cases appear to be hereditary. At any rate there are persons in good average health, having good average digestion who do not have an active gastric juice and who may never have had an active gastric juice, and in whom therefore can be no appetite gastric factor. Such cases are therefore more striking than my experiments on the fistula man of removing all the appetite gastric secretion before permitting the food to get into the stomach, because, in my fistula man, we still have a continuous secretion and the action of the chemical secretagogues in the stomach itself, but in these achlorhydric or apeptic cases, all the phases of gastric secretion are absent.

In view of these facts, what is the significance of appetite and appetite gastric juice for digestion and nutrition in man? A satisfactory answer to this question involves the complete analysis of the genesis or nature of appetite and hunger. We have attempted such an analysis in experiments already reported in part, but the subject is too complex to enter into in detail here. This much may be pointed out, however. Appetite depends not only on memory process of past experience with palatable food as positive phases, and the memory process of removal of hunger pangs by feeding, but the presence of this memory process in consciousness depends on certain conditions of the alimentary tract. When the stream of afferent impulses from the alimentary tract and possibly other visceral organs become altered in quantity or quality from the normal, these impulses suppress or render impossible the existence of appetite. Hence it would appear that existence of appetite is an indication of a proper condition of the alimentary tract to handle the

food in the way of motility and secretion, and that this is the chief biological significance of appetite. The production of appetite gastric juice is of secondary importance and of practical significance only in cases of extreme impairment of gastric secretion.

This conclusion is borne out by other experiments on animals, although these have not yet been interpreted in this light, so far as I know. Dr. Cannon showed, years ago, that section of both vagi delays evacuation from the stomach only for the first three or four days. After this preliminary impairment of motility, the gastric digestion became practically normal, although after section of both vagi there can be no secretion of appetite gastric juice. The evacuation time of the stomach under normal conditions is of course a measure both of gastric secretion and gastric motility. When studying the alimentary tract in parathyroidtetany I noted also that forcibly feeding a cat with meat it would not take voluntarily led to practically as rapid evacuation of the stomach as when the same cat was fed meat that it took voluntarily, provided the same quantity of meat was used in each case. We may assume that when an animal or person is fed forcibly there is no appetite secretion of gastric juice even if the person has an appetite for other food, yet the evacuation period for the stomach is practically normal.

It seems clear to me that a continuous secretion of gastric juice in the stomach of normal man and animals, in the total absence of food in the stomach and of psychic stimulation, is sufficient to initiate gastric digestion, and, therefore, to ensure sufficiency of gastric secretion, provided the condition of the gastric glands and of gastric and intestinal motility are normal. The appetite secretion of gastric juice is simply an accessory factor of safety. In the normal stomach it does not appear to be needed at all.

Another important aspect of appetite may be said to have a rather negative bearing. From what we know of the inhibitory reflex control of motility and secretion of the alimentary tract, it is highly probable that eating unpalatable food or eating without appetite will induce some impairment of gastrointestinal motility and this inhibition may have an important bearing on the gastrointestinal indigestion.

These new aspects of appetite and appetite gastric secretion minimize the importance of the various therapeutic measures that are supposed to induce or augment the appetite gastric juice. It emphasizes at the same time the importance of more complete analysis of appetite and establishment of practical measures of control of appetite itself as a real problem.

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SOME OF THE NEWER IDEAS IN DIETETIC THERAPY.

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Scope of this paper. Progress in internal medicine in the past few years has been so rapid, and the contributions to the literature so numerous, that it is somewhat difficult for the busy practitioner to find time to read and digest even the more important articles.

In no line has there recently been greater progress than in the problems of metabolism, and the practical points evolved are available for use in scientific dietetics. Although physicians have written of diet since the time of Hippocrates, most of the scientific work on which modern dietetic therapy is based has been done in the last fifteen years. In most chronic disorders the diet is the main factor in treatment. I need but mention a few diseases, such as diabetes, gout, nephritis, chronic constipation, and practically all of the functional digestive disturbances, to impress on you the truth of the above statement. I do not intend to treat exhaustively any of the topics I may call to your attention, but simply mention some of the exploded ideas, and indicate briefly some of the newer, well-established points in dietetic therapy.

Intestinal stasis and proteid putrefaction. We all see many patients on whom it is difficult at first to make an exact diagnosis. While they do not seem to have any definite, clear-cut ailment, they complain of various vague symptoms; minor aches and pains in various parts of the body, lack of energy, tired feeling, headache, nervous symptoms, etc. It seems that we must always have a sort of "blanket diagnosis" to cover this group. Twenty years ago these symptoms were attributed to various diatheses, one of the most popular of which was the "uric acid" diathesis. Ten years ago the ductless glands were supposed to be at fault, and these patients were supposed to have autointoxications from some one or more of these glands. The present fad seems to be intestinal toxemia, and the poor, struggling, and often maltreated bowel must now bear the blame for an enormous variety of symptoms and ailments.

Leaving out the cases of organic disease—tuberculosis, cancer, sepsis of low grade, etc.,—we have left a group in which stasis in the bowel really is the cause of the trouble.

Metchnikoff was one of the pioneers in this field, with his now-exploded theory of buttermilk therapy to change the intestinal bacterial flora and live forever. It is now known that the intestinal

flora and even the products of the same bacteria may be changed by altering the percentages of proteid, fat, and carbohydrate in the diet, as was demonstrated by Kendall,¹ and that the efficacy of buttermilk is dependent, not necessarily on the Bulgarian bacillus, but on the change in the food furnished the intestinal bacteria.

There is still prevalent the idea that certain kinds of meat, particularly beef, are the source of particularly virulent poisons formed in the colon by bacterial activity. There is, I believe, no accepted experimental or other proof that beef is a worse offender than any other proteid. All of the proteids are made up of various combinations of amino-acids, of which there are about twenty known ones at the present time. All proteids are broken up into their constituent amino-acids in the bowel (Folin²) and are absorbed in this form, as demonstrated by the work of Kutscher, Abderhalden, Folin, and others.

It is well known that very virulent poisons may be formed by the action of bacteria on proteids, but no more powerful poisons are formed from beef-proteid than from milk-proteid or wheat-proteid (Vaughan³). Indol, skatol, phenol, and cresol are poisonous products of bacterial activity on proteid in the large intestine, but when absorbed these substances are oxidized, and unite with sulphuric acid to form the so-called conjugated (or ethereal) sulphates, or with glycuronic acid to form the conjugated glycuronates. These are harmless substances which are promptly eliminated in the urine (Howell⁴). Certain other poisons are derived from the dead bodies of bacteria, but these substances are with difficulty absorbed through animal membranes and, for the most part, pass out in the feces. Furthermore, they do not long remain poisonous in the intestinal canal (Vaughan³). It would seem, then, that we must give up the idea that there are any specific poisons in animal proteids. Vegetable proteids form the same poisons, and nature provides for their elimination in the same way. A certain amount of proteid putrefaction in the colon is a constant and normal occurrence (Howell⁵). If the bowels can be induced to empty themselves normally, we need not fear poisoning from this source. There are, of course, persons whose bowels do not empty themselves properly, and who do absorb more poisons than can be taken care of in the usual way, but the vast majority of these are relieved by careful attention to the diet. The ingestion of sufficient fruit and vegetables to furnish bulk, and enough water between meals to prevent inspissation of the feces, and the cultivation of the habit of regularity, will usually relieve the symptoms without recourse to liquid paraffine or other laxatives. In a small percentage of these patients, liquid paraffine is a valuable laxative; in a very much smaller group, surgery may be necessary. But taking the group as a whole, prunes are much more valuable than the knife. The

work of such men as Lane, Bainbridge, Kellogg, and Martin is worthy of careful study, but should be interpreted alongside that of Hertz, Cannon, Kendall, Folin, and Vaughan.

"Biliousness" and "Torpid Liver." These terms are applied to the symptom-complex including headache, foul taste, "bloating," nausea, and vomiting of bile, with or without jaundice. Leaving out the patients exhibiting these symptoms who have organic disease such as gall-stones, peptic ulcer, chronic appendicitis, etc., the rest fall into the class of those who eat too much carbohydrate too hurriedly. Fermentation occurs in the stomach, and the gas and acids formed irritate the gastric mucosa, and finally the much abused organ rebels and expels the noxious material. Bile is apt to regurgitate through the pylorus, and is vomited after the food is expelled. The patient, seeing the bile, naturally thinks the liver is at fault, and too often is encouraged in this idea by the physician. It should be explained to the patient that the trouble is due, not to any fault of the liver, but to his own indiscretions in eating. The treatment is obvious; reduce the amount of high percentage carbohydrates in the food, and teach the patient to chew the remainder carefully, so that the thorough mixing of the saliva with the food will promote normal digestion and prevent fermentation. The so-called cholagogues are of absolutely no value in these cases, as they do not attack at the seat of trouble.

Rheumatism, Gout, and "Red Meat." Rheumatism is a very vague term. It is used by some to cover practically all the aches and pains in muscles and joints, from the pains accompanying any acute infection, to those of the more serious group of the deforming arthritides. If we exclude the acute infections and the joint troubles due to diseases of metabolism, such as gout, and the degenerative processes of advanced years, we have left a fairly well-defined clinical group of varying etiology, but probably all of infectious origin. You are all familiar with the wonderful work done in the past five years by Billings, and his group of co-workers on the subject of focal infections. Most, if not all, of the above defined group of joint diseases are caused by a low-grade infection having its focus in the tonsils, teeth, sinuses, prostate, or other tissues, and sending into the blood-stream numbers of bacteria which lodge in the relatively nonvascular tissues about the joints and cause pathological changes.

Rheumatism in the sense mentioned above, is, then, an infectious disease, and its course cannot be altered by abstaining from eating meat, red or otherwise. The focus of infection must be found and removed, proper exercises given to break up the adhesions formed in ligaments, tendons, and muscles, and a diet given to correct the accompanying anemia and to build up atrophied muscles. A rather high proteid diet with plenty of meat included is indicated (Bill-

ings⁶). Plenty of fruit should be included to help maintain the normal reaction of the blood and urine. As it has been demonstrated that practically all the fruit and vegetable acids except benzoic (occurring in prunes, plums, and cranberries) form alkaline carbonates when absorbed and oxidized, we must discard the idea that acid fruits and vegetables are harmful in rheumatism because they make the blood too acid. On the contrary, they increase the alkalinity and help to neutralize the acids formed in the metabolism of the proteids and fats (Sherman and Gettler⁷). Grapefruit, oranges, and lemons are especially valuable in combating acidosis.

Gout is a different problem. It seems to be a disease of metabolism in which the purin bases, from which uric acid is formed, take some part. It is quite generally agreed that the foods containing a relatively high percentage of these substances should be limited in amount. We should remember, however, that uric acid is a normal product of metabolism, and that patients may have acute attacks of gout even on a purin-free diet.

It was for years the custom to exclude from the diet of gouty patients the red meats—beef, mutton, venison, etc.,—and give lamb, veal, and chicken, if meat were allowed at all. We now know that beef contains less than one-third the amount of uric acid-forming products that lamb, veal, or chicken contain. If we wish to give our gouty patient some meat, a nice, juicy sirloin is about the best variety we can choose. The old red-meat idea dies hard, but it must be relegated to the scrap-heap, in the light of the findings of modern biological chemists (Hall⁸).

Plenty of fruit, vegetables, and water, with a moderate amount of beef, mutton, venison, or fowl, with fish, milk and eggs in fairly liberal quantities, seems to be the diet on which gouty patients do best.

Chronic Nephritis. I know of no class of patients in which the matter of diet is more important and at the same time more difficult of determination than in the chronic nephritics. In spite of the large amount of work that has been done on the subject, we still lack exact methods of measuring the excretory capacity of the kidneys. The phenolsulphonaphthalein test seems to be of considerable value, and the estimation of the non-proteid nitrogen in the blood of even more value. Retention of nitrogenous products seems to be a danger signal (Seymour⁹). We have not even a satisfactory classification of the different kinds of nephritis. For clinical purposes, we may divide the chronic cases into two general classes, those with, and those without hypertension. The diet problem is much the same in both classes.

One of the most important points for consideration is the amount of protein to give. The importance of a relatively low protein diet

in nephritis has been recognized for some years. Arnold¹⁰ in 1910 advocated a maximum of 90 grams and minimum of 50 grams daily as a general working basis, the more advanced cases being allowed but 50 grams or less. Goodall¹¹ advocated five day periods of practically protein-free diet, on the assumption that accumulated nitrogenous waste products would be better excreted under these conditions.

Inasmuch as the body will daily use up, even in starvation, 25 to 35 grams of protein, which must come from the body tissues if not ingested, it seems to me safe to assume that protein ingested up to this amount, or probably a little more, will be entirely used up in replacing tissue waste, and consequently its ingestion will throw no additional burden on the kidneys. If we put a patient who has been on a low protein diet, and who presumably has little or no reserve supply of circulating protein, on a protein-free diet, it seems to me that his muscles and viscera must suffer. The fact that normal persons on a full diet can be deprived of protein for periods of seven to ten days without *obvious* injurious effects, as demonstrated by Folin¹², would hardly seem to be conclusive proof of the value of these periods of protein starvation for nephritics. Phipps¹³ in a recent article in the *Boston Medical and Surgical Journal*, has called attention to the fact that too great a reduction in the protein intake of patients with nephritis may be harmful, and certain cases show marked improvement on increasing the protein content of the diet considerably above the accepted standards.

We would say, then, that the amount of protein should vary between 40 and 90 grams daily, according to the excretory ability of the kidneys. If it is impracticable to test the blood for nitrogenous waste products, the disappearance of symptoms such as morning headache, nausea, vomiting, diarrhea, etc., will serve as a rough guide. The kind of protein given would be decided by factors other than the condition of the kidneys. There is no necessity of keeping these patients on a meat-free diet. The total protein intake is the important point.

The amount of water to be given is another important point. If the kidneys can eliminate a urine of only 1.015 specific gravity, we must give enough fluid so that the waste products may be eliminated at that concentration or less, if the kidneys will take care of the necessary fluid. In some cases of chronic nephritis, the milder symptoms often promptly disappear by such simple means as increasing the fluid intake. The daily ingestion as well as the daily output of fluid must be observed, and the patient must be watched carefully for oedema.

How much salt to allow is another debated question. I think it is safe treatment to limit the ingestion in cases with edema, although Fischer¹⁴ advocates free salt, free fluids and free alkali.

Crofton¹⁵ discussed the other view very ably. Much experimental work has recently been done on the subject.

The general condition of the patient should not be lost sight of while making abstruse calculations in grams, calories, and centimeters. If the patient is obese, his weight should be reduced to normal, in order to relieve his heart of unnecessary work. If he is thin and anemic, it may be well to put on a little weight. The weight may be easily controlled by regulation of the fat and carbohydrate intake. Remember that many obese patients with an overburdened heart and congestion of the kidneys are wrongfully accused of having Bright's disease, because they have a high blood pressure and a little albumin in the urine—symptoms which are relieved by reduction of weight, if there is no organic disease.

Obesity and Heart Disease. While many writers, (Oertel, Van Noorden, Osler, Smith, Robinson, et al.), have advised the reduction of weight of obese cardiacs, the salient points in treatment and reasons therefor do not seem to be generally understood even by the medical profession. If the heart is damaged by disease, valvular or myocardial, the well portion of the heart must do extra work to compensate for the inability of the diseased portion to do its work. The reserve margin of strength is thereby lessened in proportion to the damage done. If a patient with heart disease is fifty pounds overweight, he throws a tremendous amount of extra and unnecessary work on his already-overworked heart. He not only carries about the extra weight, but the heart must pump blood through the extra tissue. Such patients should be reduced to normal weight, or even slightly below normal.

The treatment is almost entirely dietetic. Exercise is reduced to a minimum until the heart is compensated, and then very gradually increased (Smith¹⁶). Care should be taken to include sufficient protein in the diet to avoid wasting of body tissues with resulting weakness, and the weight should not be dropped too rapidly, an average of two pounds weekly being fast enough. Starvation in obesity, by the way, is neither pleasant for the patient, necessary for the desired result, nor scientific in principle. It is possible to reduce weight with the greatest ease by limiting the ingestion of fats, sweets, and high-percentage starch foods, and teaching the patient to substitute potato and other vegetables for bread, and fruit and salads for sweet desserts.

Dextrose as a "Heart Food." There are a few of the newer theories that I wish to mention briefly. One of them is the idea that as dextrose is a "heart food," consequently sugar should be fed freely to all classes of cardiac cases. This theory originated, I believe, with Locke,¹⁷ who found that if a fresh-beating heart be perfused with Ringer's solution, with dextrose added, some of the dextrose would be used up by the heart. If we will but remember that in life, the

percentage of sugar in the blood is maintained at a constant level (about 0.1 percent), and cannot be varied to any extent by giving or withholding carbohydrate food, we will see the absurdity of feeding large amounts of sugar to cardiacs, in order to "feed" the heart muscle.

Starvation Treatment of Diabetes. Allen's starvation treatment for diabetics has recently been so freely discussed that I merely mention it as a distinct addition to our armamentarium in the treatment of the disease.

Accessory Factors in Diet. It has recently been demonstrated that there are certain substances that are necessary for proper nutrition and for growth, apart from the nutritional value as expressed in calories. It has long been known that scurvy and beri-beri are caused by the lack of some element or elements in the food, and that these diseases may be cured by supplying—in the case of scurvy, organic acids, and in the case of beri-beri, some unknown substance contained in the outer covering of the rice kernel, which is ordinarily removed in the preparation of the rice for market. Pellagra and osteomalacia probably belong to this class of diseases.

More recently it has been shown that certain fats contain elements without which the growth of young animals is retarded. For instance, rats fed on a mixed diet with lard as the only fat element soon show signs of malnutrition and lack of growth. Replacing a portion of the lard with cod-liver oil causes a prompt restoration of nutrition and growth. Milk-fat, egg-fat, and cod-liver oil all contain the necessary ingredients for growth; lard and some other fats of both animal and vegetable origin seem to lack them partially or completely (Mendel¹⁸). The character and composition of these substances have not yet been demonstrated, but if the diet is sufficiently varied, there is little danger of not having included a sufficient amount of these substances.

Anaphylaxis. Much valuable work has recently been done in studying hay fever, asthma, and other anaphylactic phenomena. Many of the unfortunate persons afflicted with these diseases seem to be sensitized to certain proteids, the exhibition of which promptly brings on an attack. In certain cases, some articles of food seem to be the offending substance, as for instance, eggs, or fish, or cauliflower. The patient is vaccinated with various substances until the offending substance is determined, and if it happens to be an article of food, relief is experienced by excluding this article from the diet. More work is necessary to demonstrate the exact value of these findings.

The appetite is no longer considered a safe guide as regards body requirements. The best possible illustration in this connection is the child's love of candy. No one, I believe, would maintain that the candy of which the child is so fond, is good food for the child.

Our *tastes* are merely *habits* of eating, and may be changed with surprisingly little difficulty. A detailed knowledge of the composition of all common articles of food, and a general knowledge of metabolism and the excretory processes are indispensable in the practice of internal medicine.

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ESSENTIAL PRINCIPLES IN THE FEEDING OF THE SICK.

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In principle there should be no essential difference between treating disease by means of medicine and treating disease by means of food. In practice, however, a difference enters on account of the presence of a third party, namely, the cook. Whereas a doctor, in prescribing digitalis can be sure of the preparation used, in giving food it is necessary for him to make sure that it is correctly prepared and served. This makes three human factors of importance in dietetics—first the physician, second the patient, and third the cook.

If dietetic treatment is to be successful, each member of this group must have his own role to play. The physician on whom lies the greatest burden, must first of all know *what* foods he wishes his patient to eat, *why* he prescribes such foods and even in many cases *how* to prepare them. It is not necessary for him to carry in his mind a complete list of food values, but he must know where to obtain such a list. As he knows what are the indications for the use of the salicylates, so he must know when to prescribe a salt-free diet for a patient with nephritis.

For some reason or other considerable obscurity has consistently shrouded the whole question of food in disease, when, as a matter of fact, the question is primarily a simple one. Undoubtedly some of the obscurity has arisen from the attempt to diet by generalization, from the attempt to prescribe for certain diseases certain diet lists. This would be the same as telling the patient coming to your office with a heart lesion that he must take digitalis, regardless of the condition of his heart muscle. This attitude of prescribing a diet list for a general condition must give way to a deliberate attempt at individualization. Any experience with the treatment of diabetic patients proves not only that no two patients are alike but that the same patient will differ in his food requirements from week to week, or even from day to day. Only by careful watching of the patient's general condition and by greater study of the various fundamental changes which call for dietary changes, can the dietetic needs of any patient be realized. The use of the so-called "salt-free, nitrogen-poor diet" as a means of treating *nephritis* is a most absurd and illogical general assumption. If the patient with nephritis shows signs of salt retention, a salt-free diet is indicated; if, on the other hand, his symptoms seem to indicate poison-

ing with nitrogenous end products, then the nitrogen in the food is limited; but what each patient requires must be determined for each patient and not for his disease.

To return then to the role of the physician, he must be the guiding spirit in the general cooperative scheme between physician, patient and cook; he must first acquire the basal knowledge of his patient, without which feeding will simply be a stab in the dark; and it is likewise he who must instruct both the patient and the cook in the means necessary to carry out his orders. Formerly we hesitated about taking our patient into our confidence, and we told him to obey our orders with regard to food without making any attempt to tell him why these orders were given. I feel that such a course not only will never achieve results but, to a certain extent, will hinder the progress of the food problem in disease. If our patient is intelligent enough to carry out orders, we must assume enough intelligence on his part to cooperate in successfully treating him. It is not difficult to give a patient the means of learning what he should know. It is not sufficient for him, any more than for the physician, to burden himself with long lists of prescribed and proscribed foods. He should be told, first of all, what there is in his disease which requires the diet he is supposed to take, and he should be made to understand, as far as it is possible for him to understand, the *reasons* for everything that is ordered and everything that is forbidden. Then he can be told where he can obtain the proper knowledge to assist him in carrying out the orders. This knowledge at present is extremely easy to obtain. There are several good textbooks on the subject which can be easily understood by the lay mind, and bulletins issued by the Department of Agriculture will, with a little help from the physician, give most all the needed information.

Assuming now that both the physician and patient are ready to perform their tasks, there yet remains the cook to be considered. In institutions where a trained dietitian is in charge of the feeding of patients the task is simple. Orders are given and orders are carried out; no one has to bother about it. But where the food question really counts is in chronic diseases, and patients with chronic diseases stay in a hospital or an institution only long enough to receive their primary training. Therefore, if the food question is to be successfully handled, attention must be directed essentially at the person who has charge of the preparation of the food outside of the institution. Whether this be the patient, patient's wife or cook, makes no difference; on some individual must be centered this responsibility. It is our practice, if a patient has had a preliminary cure in an institution, to allow the patient or some member of his family free access to the diet kitchen where his foods are prepared; and, if he is not in an institution, we take great pains to show him

the method of properly cooking his food, and we have many recipes printed for his use. Unfortunately, it is frequently the case that we, as physicians, are not able to impart specific enough knowledge to the cook, as is exemplified in the case of a young diabetic patient, whose intelligent mother was well able to carry out all instructions specifically given. But one day the reappearance of sugar caused considerable worry. The mother insisted that she was following out our instructions to the letter, and it was only when everything that the patient ate was written down on paper that we discovered that he had been eating beet-soup. He was allowed soups but for some reason beets were not in the excluded articles of food.

One point of considerable importance should be mentioned here—the value, even the necessity of proper charting. At least in the beginning when the patient is first learning his food needs he should be told to keep a complete diary of everything he does and eats and drinks. Only by such a record can results of commission or omission be detected and corrected, and many a worrisome day and night will be saved by this simple precaution.

In conclusion then, the elemental essentials in properly feeding a patient are, first, individualization and, second, cooperation by physician, patient and cook. The prime knowledge must reside in the physician but, if dietetic therapeutics are to be successful, he must impart considerable knowledge both to his patient and to the cook.

DIGESTIVE DISTURBANCES OF GALL STONE ORIGIN.

By FRANCIS ROE BENHAM, M. D., Syracuse, N. Y.

It is because of the many cases of so-called dyspepsia and indigestion which have proved to be caused by pathologic conditions of other organs, that I have chosen to invite your attention for a brief period to the recital of a few cases of cholelithiasis. Space will permit but a cursory introductory to this subject concerning which volumes have been written. That stones should develop at all in the human anatomy seems a phenomenon almost unbelievable. Seeing, however, is believing and we have all seen them many times. I will simply mention a few of the causes which are necessary for the formation of gall stones.

Cholelithiasis is a most common disease, much more common than was formerly supposed. Many cases of so-called gastralgia, acute and chronic indigestion, ulcer of the stomach, diseases of the pancreas and appendicitis prove to be gall stones. Osler states that gall stones are found at autopsies in from 5 to 10 percent of all cases that die of other causes. If this be true, what a common malady it is. It is true that other diseases affecting the pylorus, the duodenum, or the head of the pancreas are sometimes diagnosed as gall stones. Unless there are very positive signs of cholelithiasis it is often very difficult to make a positive diagnosis. The x-ray and fluoroscope are at times valuable aids in diagnosis. There are cases of gall stones that give absolutely no symptoms of the disease. A stone or stones may remain quiescent in the gall bladder for a long time. This is shown to be true by finding them so frequently at operations and autopsies.

The formation of these stones is an interesting process concerning which much has been written and a great many theories expounded. The accepted view today is that there are two primary factors which must be present: first, some interference which causes either a stasis or impediment to the free flow of bile; second, some kind of bacterial infection. It is necessary that both these conditions be present, the one without the other is not sufficient. It is generally a mild catarrhal inflammation which distorts and either closes or partially closes the cystic or hepatic or common ducts and thus produces the first necessary cause, namely, some interference with the free flow of bile. The reason that gall stones do not form when there is a free flow of bile is that there is no stagnation of bile and the inroad of infection is cut off by the flow of bile washing bacteria back into the intestine. The second cause, that of infection, is

produced by many different kinds of bacteria, some of the most common being the bacillus coli communis, the bacillus typhosus, staphylococci pyogenes aureus and albus. Cases are also recorded where the infection was produced by the pneumococcus and by the bacillus of influenza. There are many avenues by way of which these germs are carried to the gall bladder. They may enter from the duodenum through the common duct, or the portal circulation and the hepatic artery may carry them to the gall bladder, or they may enter from the peritoneum through the walls of the gall bladder itself. It is seldom that infection takes place from the duodenum because, if the duodenum is in a normal condition, it is supposed to be sterile. Any disease of the duodenum favors infection of the gall bladder by extension of the trouble through the common duct. One of the most common ways for infection to be carried is by the portal vein and the most common organism found is the colon bacillus. The Bacillus typhosus may enter through the circulation from the blood or direct from the intestinal tract.

Cholelithiasis is a subject which is of vital importance and interest to both physicians and surgeons. It is of interest to the innermost from the diagnostic point of view. I believe the condition a surgical one and that treatment should be surgical. It is not rare to find in cases of gall stones, with chronic cholecystitis, that ulceration of the wall of the gall bladder takes place to such a degree that the gall bladder may rupture throwing the stone or stones into the peritoneal cavity, or that cholecysto-duodenostomy and cholecystogastrostomy have been performed by nature.

The size and number of the stones vary greatly. Merkel found one that weighed 120 grams. As many as 7,802 stones have been found in a single case reported by Otto.

I will not enter into the discussion of the predisposing causes or of the medicinal treatment, if there be such a treatment.

CASE I.

This case is a most extraordinary one from a surgical point of view. Mrs. S., age 49, born and reared in England until she was 23 years of age. Father died at the age of 42 with pneumonia, the mother at the age of 53 of heart disease. There are four brothers and three sisters all living at the present time and in good health. Patient married at the age of 22, has three children. Lived in Canada 3 years and six months, when she moved to Syracuse and has lived here since.

About two years after coming to Syracuse she had her first sickness. Was taken with what was then called inflammation of the bowels, probably appendicitis with perforation of the appendix, producing a general peritonitis; was critically ill for ten weeks when she began to improve and was finally able to be up and about, but never fully recovered. Following this sickness she consulted another doctor who, after examining her, told her she had a tumor of the womb and advised operation for its removal. She was removed to the hospital and the tumor was removed. Made a good recovery. About six months after she began to be troubled with obstinate constipation, often going

for a week at a time without evacuation. It was in such a condition as this that she was taken violently ill with intense pain in the abdomen. All the ordinary methods of producing catharsis were resorted to but were of no avail. It was impossible to get any response from the bowels. Finally it was decided to remove her to the Hospital of the Good Shepherd, where she was operated for intestinal obstruction and a portion of intestine was removed. From this operation she made a good recovery. About four weeks after leaving the hospital she took a severe cold. During a coughing paroxysm she felt something give way in her left groin and she began to have great pain; was again removed to the hospital and operated for femoral hernia. Two years after she developed a lipoma on the left shoulder. It grew very rapidly in size, so large that it interfered with the movements of her arm, so she decided to have it removed, which was done.

December 16, 1904, I was called to see her. She had fallen the day before and injured her left wrist. Upon examination I found she had a Colles' fracture which was reduced in the usual method.

March, 1904, she again consulted me concerning a pain in the stomach. She said pain would come on most any time independently of whether she had eaten anything or not. Said she had had this pain off and on ever since she had inflammation of the bowels some twenty years ago. At first the pain was mild in character and did not cause her much inconvenience. The pain had gradually increased in severity until now sometimes it seemed as if she would die. Pain was right in the stomach. The attacks would sometimes "hold off for several months and then she would have another spell." It would begin with loss of appetite, even the smell of cooking food would nauseate her, then she would begin to vomit and would be deathly sick, cold perspiration standing out on her forehead. She would be very dizzy. The pain in her stomach would be paroxysmal in character and so severe that she would have to get on her hands and knees. The character of the vomitus would be stringy mucus mixed with bile. Vomiting would not in any way relieve the pain. External applications and also medication even morphia hypodermically would not relieve. On physical examination the heart and lungs were found normal. Abdomen revealed scars of former operations, aside from which I could detect nothing abnormal. Liver was slightly enlarged. Could not palpate the gall bladder, neither could I outline it by means of percussion. Urine, sp. gr. 1025, acid, no albumin, no sugar. Bowels irregular.

Diagnosis:—Catarrhal gastritis, suspicious of gall stones.

I restricted her diet as to quantity and allowed only foods which could be easily digested. I also told her that she must not work so hard. She was doing all sorts of work, from washing clothes to pitching hay, in fact, I think she could tire out most any man. Medicinal treatment was directed towards aiding digestion. She seemed to improve under this line of treatment. I treated in this way for about a year.

September 3, 1906, I was hurriedly summoned. Upon my arrival at the house I found the patient suffering agonizing pain. She could not keep still; would pace up and down the room, wringing her hands, at times even falling to the floor in her intense suffering. My first thought was to relieve her as quickly as possible so I injected $\frac{1}{4}$ gr. morphia immediately, then gave her a few whiffs of chloroform. In about one half hour she began to be somewhat relieved so that it was possible to make a physical examination. I found abdominal wall tense and board-like. The right rectus muscle was especially noticeable, it standing out above the other muscles. There was pain and tenderness over the whole right side of the abdomen. There were no points where the tenderness was more severe than in other points. The whole right side of the abdomen seemed involved. The tongue was coated, there was

nausea and vomiting. She was unable to retain anything in her stomach. The vomiting was persistent lasting three days, during which time the pain was incessant, at times more severe than at others. The temperature ranged from 101° F. to 103° F., pulse from 110 to 120, respirations 26. At no time was there any jaundice, neither had she ever had any jaundice. The condition, as before stated, remained about the same for one week. September 9th or about one week after the onset of this sickness she was removed to the Hospital of the Good Shepherd. The day after her condition began to improve. A positive diagnosis was not made but gall stones was the prevailing opinion.

The following day a cholecystectomy was performed by me. The gall bladder showed marked thickening from the frequent exacerbations of cholecystitis. The gall bladder was completely filled with three large stones, six small ones, and pus. The cystic duct was entirely occluded. Gall bladder was so full of stones and pus that when incised the pus flew out in a stream for some distance, so great was the pressure within. Had this case not been relieved by operative interference the gall bladder would have burst, throwing the gall stones and pus into the abdominal cavity with probable fatal results. The patient made a speedy recovery and today is in good health.

As we look over the foregoing history there are several points which impress themselves upon me and first of all, the length of time this patient had gall stones. The thickness of the gall bladder and the size of the stones suggest this. In my opinion the trouble in this case started when she was a young woman suffering from frequent attacks of gastritis which became chronic, the condition extending into the duodenum and thence into the common and cystic ducts to the gall bladder. If this be true we have one of the necessary causes of stone formation, the swelling and thickening of the mucous membranes producing an impediment to the free flow of bile. The other necessary cause, that of infection, arose when this case had inflammation of the bowels, which was probably caused by the ruptured appendix producing general peritonitis. This case had many other severe illnesses, and yet no one ever discovered the gall stones or the cholecystitis. The treatment had all been for the catarrhal stomach condition.

Again we find this disease in a woman who worked for a living and at hard manual labor. We are told in text books that this condition is rare in an active person, in fact sedentary habits are a predisposing cause of the disease.

CASE II.

Mrs. C., of Buffalo, has always been in good health except for frequent bilious attacks. Sometimes would go for months without any digestive symptoms or bilious attacks. These attacks she attributes to nervous exhaustion. Is never affected unless she has attended some particular meeting or convention in which she has had an important part, either in discussion or paper reading. It was while she was attending a convention in this city that this patient came under my care and attention. These so-called bilious attacks would generally follow mental excitement and worry. They would begin in the epigastrium, this discomfort increasing until she would become extremely nauseated and finally vomit. Several years ago vomiting would relieve her and if proper

care was taken of her food she would steadily improve and convalescence would be short. She has thus suffered these kind of attacks for many years.

She had a rather strenuous week in Syracuse attending a convention and had retired for the night when she felt pain in the stomach and was nauseated, consequently she drank some hot water and some soda and began to vomit. She vomited at intervals all night and the following day without relief. She was removed to the Homeopathic Hospital for careful observation, the vomiting continuing. There was general abdominal pain and tenderness. The abdominal wall was now becoming tense. Pain and tenderness marked over the appendix and gall bladder. Blood count showed leukocytes, 12,000. I advised operation which was refused. Doctor J. W. Candee was called in consultation. He also advised operation and immediately. After much discussion the patient agreed to be operated.

Consequently, at 8 p. m., I removed an acutely inflamed appendix. Believing the frequent attacks of indigestion and also the bilious attacks to be due to trouble in the gall bladder, the right rectus incision was carried up so as to expose the gall bladder. Bringing the gall bladder up into the incision it appeared somewhat increased in size and very hard, the gall bladder was filled with stones and the internal pressure greatly increased. A trocar and cannula were introduced and about six ounces of thick bile removed. An incision was now made into the gall bladder and five large stones about the size of hickory nuts were removed. In the cystic duct were three smaller stones, these were removed through the gall bladder. Rubber tube drainage was introduced in the usual manner and the incision closed. Recovery uneventful except that she developed phlebitis of both legs.

CASE III.

Patient 33 years of age. Family history negative. Two brothers and two sisters living and well. Married, no children, and no female trouble to her knowledge. Menses regular and normal. Has complained for the last five years of attacks of indigestion, so-called. Would be taken with pain in the pit of epigastrium and would vomit. Vomiting would relieve her, but now she says the more she vomits the more she feels like vomiting. The nausea is continuous. Pain is also constant, not free from pain at any time while she has these attacks. Had been under the care of many doctors and had a great deal of treatment for digestive disturbances. She would gradually improve and finally recover. It was during such a sick spell as this that I was called in consultation. Physical examination revealed an abdomen hard and tense, with general abdominal pain and tenderness, temperature 101, pulse 110, blood count showed marked leukocytosis. I advised removal to hospital and operation. Diagnosis, acute cholecystitis and possibly gall stones. She was removed to the Homeopathic Hospital and the high incision paralled to costal cartilages of right side made, the gall bladder exposed and opened. It was filled with very thick bile mixed with pus. The cystic duct was entirely occluded by a single stone. This I removed through the gall bladder and the usual large size rubber tube drainage was used.

I have briefly reported these cases of cholelithiasis to show how frequently these common cases of so-called dyspepsia and indigestion prove to be gall stones.

I believe in routine examinations of the gall bladder. In cases requiring the opening of the abdomen, when there is no contraindication, the gall bladder should always be examined to discover the

presence of stones, to ascertain whether or not it is collapsible, to discover adhesions aptly called by Morris "Cobwebs in the attic of the abdomen," to see whether the wall of the gall bladder is thickened from attacks of cholecystitis and to search for many other pathologic conditions around the gall bladder which influence it from without.

Who opens the abdomen today that does not examine and remove the appendix. Pathologic or normal the appendix is removed unless there is some reason for not doing so.

I am just as firm a believer in examinations and treatment of the pathologic conditions of the gall bladder. Should any be found I think the time to treat these cases is at the first sitting, so-called, that is, providing there is no contraindication. In this way many second operations could be avoided. In many cases of cholelithiasis the symptoms are not in the gall bladder. You do not have to suffer from an attack of biliary colic to have gall stones. The colic formerly was supposed to be produced by the passage of the stone. Of course this might cause severe pain varying with size of the stone and condition of ducts. Seldom have stones been found in the feces following an attack of biliary colic. We believe the intense pain and agony to be produced by the violent peristalsis. The gall bladder and ducts, endeavoring to rid themselves of stones or viscid bile, contract so violently that colic is produced called biliary colic.

This idea is further substantiated by the fact that gall stones are found in feces where there has been no colic or pain proving that their passage has been painless. In the great majority of cases of gall stone disease you have, at some particular time and generally at irregular intervals, attacks of intense, agonizing, unendurable pain commonly called gall stone colic. The picture of a patient afflicted with gall stone colic is common to us all and a further description will not be given. It is these attacks of excruciating agony that bring these cases as a rule to the surgeon.

Concerning the treatment of these cases, when the stones are confined to the gall bladder there is a difference of opinion, some favoring cholecystectomy, others claim cholecystotomy and drainage to give the best result.

My method has been to perform cholecystectomy unless there is some contraindication, such as in the very old, and feeble, or where for anatomical reasons the removal of the gall bladder should be fatal. I have chosen these cases to show the different clinical pictures presented.

In the first case we have a patient that was unfortunate enough to have had her abdomen opened on more than one occasion and with a gall bladder full of gall stones causing digestive trouble continually and yet, undiscovered and unrelieved; a typical picture of gall stone disease with the colic, vomiting, shock, etc. I know that

many times, while operating, conditions arise which make it impossible to do all that the surgeon thinks necessary. In such cases it is excusable to wait until some future time. I think it the duty of the surgeon to tell the patient of the existing pathology and recommend further operation. I believe it the duty of the surgeon to make a thorough examination of the abdominal contents. Because you have discovered abnormalities in one part, is no reason to believe that others in the same subject do not exist. It is for this reason that a thorough intra-abdominal examination should be made to discover pathologic conditions or beginning pathologic conditions that exist, causing trouble and discomfort without having been diagnosed previous to celiotomy.

SECRETINS.

By FRED C. KOCH, Ph. D.,

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In this paper I shall in a very general way discuss the present state of our knowledge in regard to the character, distribution and action of secretins. By secretins I do not mean the pancreatic secretin of Bayliss and Starling only, but all those naturally occurring secretagogues found in tissues, and which are considered to be involved in bringing about more or less specific secretory effects in digestive glands.

The most important discovery in this connection is the observation by Popielski in 1900 that, when dilute hydrochloric acid is placed in the duodenum, a flow of pancreatic juice results. As a result of these observations and of studies by Bayliss and Starling, these authors in 1902 announced the discovery of their pancreatic secretin. Edkins in 1906, and Gross simultaneously, using similar methods, reported that probably gastric glands are similarly excited to secretion by a substance in the gastric mucosa. This substance Edkins called gastrin. Although text books have quite generally accepted the view that secretin is a true specific pancreatic secretagogue and gastrin another specific substance, still the results reported by numerous observers in both of these and in related fields of research by no means warrant the unqualified acceptance thereof. Before we can accept these views as facts it appears to the biological chemist that a number of questions must be thoroughly looked into. I shall take up these questions in proper order and under each briefly discuss the results obtained which pertain to that phase of the general problem.

First. Are the secretory effects observed in physiological studies with tissue extracts due to mixtures or to one substance in the extracts?

The method employed in preparing these extracts has, in general, been that of extracting the tissue with hot dilute hydrochloric acid, concentrating, neutralizing partly and precipitating proteins with alcohol. The alcoholic filtrate is then evaporated to small volume and treated in various ways to remove impurities. Some of the studies have been conducted upon extracts of tissues obtained with hot water, without removal of proteins. It is hardly necessary to state that the latter method is indeed a very crude one and may in part account for the general secretagogue action reported by some observers. Bayliss and Starling first used the former method when

they reported their discovery. They were at once attacked by Von Furth, Popielski and others who claimed that tissue extracts in general act in the same way on the pancreas. Bayliss and Starling granted this in part and aimed to meet this criticism by improving their process so as to remove these substances found in all tissues and leave the secretin behind. The foreign substances they aimed to remove are, in general, vasodilators which have been called "vasodilatin" by Popielski and which have been considered to be choline, etc., by other observers. Bayliss and Starling attempted to remove these substances from their concentrated preparations by extraction with absolute alcohol and claimed to have succeeded in obtaining active secretin preparations free from the depressor action on the circulation. However, neither they nor others have ever, to my knowledge, published work in which they have actually demonstrated their secretin to be free from depressor action, and furthermore, their reports show that the more they reduced the vasodilator action the more they also decreased the secretagogue action on the pancreas. The same is to some extent true as to gastrin preparations and as to other attempts at purification of the extracts. On the other hand a pure "vasodilatin" has not been prepared, nor have such substances as choline been found to be identical with the active ingredients in the extracts. The secretagogue action of choline is very slight and it is very doubtful indeed whether choline is present in the secretins to any appreciable extent.

In view of the above statements we must conclude that we really know very little of a definite character as to the true nature of the secretins. Either we are dealing with two or more substances in each extract, which we have not been able to separate accurately, or we are dealing with one or more substances possessing vasodilator and secretagogue actions, possibly the latter as a result of the former or vice versa. It is, of course, also possible that we have two or more substances which, acting together, bring about a greater secretion than either one alone. Thus vasodilation brought about by one substance together with a true direct cell stimulation by another would fulfill the requirements. Not until we have prepared the physiologically active constituents in pure form from the various tissue extracts can we satisfactorily answer this question. It is, of course, needless to state that all the studies must be quantitative in every respect, that is, a quantitative chemical as well as physiological assay must be made of each extract and the secretions obtained must also be quantitatively measured and studied as to composition and activities.

Second. If we assume that one substance in each tissue is responsible for the secretagogue action, is that substance specific for each tissue or is one and the same substance found in widely varying concentrations in different tissues?

Popielski and his coworkers have contended that the pancreatic secretin activity, found in duodenal extracts, is also found in numerous other animal tissues as well as in Witte peptone, and that, in any case, the secretagogue action is due to "vasodilatin." He claims that "vasodilatin" causes decreased coagulability of the blood and vasodilatation, and as a result thereof greater activity in all the glands of the alimentary tract. He considers that greater fluidity of the blood as well as vasodilation are necessary for increased secretion. Thus, according to his view, which, however, is not experimentally definitely established by him, we are not dealing with specific substances, but possibly with varying concentrations of "vasodilatin," whatever that may be. If this is true, then we may explain the quantitatively different results obtained with various tissue extracts in comparative studies as due to this variation in concentration of "vasodilatin." To prove or disprove this view the preparation of pure "vasodilatin" or a quantitative fraction thereof is necessary. On the other hand, many of the studies on pancreatic secretin and on gastrin indicate that these two substances, at least, are quite specific in chemical properties and in action and that they differ from each other. This will be gone into in greater detail below. Although gastrin and secretin do not appear to be identical, still numerous studies indicate the presence of gastrin and secretin *activities* in crude extracts from numerous tissues. What these substances are is not known at present.

Third. If the action of the extracts is due to one and the same substance throughout or to a number of specific substances, are all the digestive glands irritable by these substances, but some more so than others? In other words, is there a quantitative specificity in this action?

Again we must repeat that Popielski's claim may be explained by such an interpretation as the above, and this especially so in view of his contention that an overdose of a given extract may prevent secretion, whereas a smaller dose might be effective. However, it is not at all unlikely that many responses which are considered positive may be really secondary effects resulting from the direct action of a substance on another gland or organ and then, as a result of coordination, we have secretion in an unexpected region or gland. On the other hand it would not be at all surprising to find that different organs possess different thresholds which must be overcome by these vasodilatin or by the specific secretins before we can have an active secretion. While Popielski's view is probably in part true or, at any rate, can be explained in these various ways, still experimental observations with pancreatic secretin and gastrin have not been able to prove a stimulation of salivary secretion by either of these substances, whether in small, medium or

in large doses. The complete answer to this question also, of course, awaits the purification of the substances involved.

Fourth. How do pancreatic secretin and gastrin differ from each other, if at all? It has already been stated that these substances are prepared by very similar methods. Both appear to be basic substances, both are heat stable and possess similar solubilities. It is interesting to note that a group of substances which act as secretagogues all give similar reactions. Thus pilocarpine, histamine, active secretin and gastrin preparations all give a positive diazobenzenesulphonic acid reaction. Now both pilocarpine and histamine contain the imidazol ring found in the aminoacid, histidine; these reactions then indicate that secretin and gastrin probably also are imidazol derivatives. Secretin, however, appears to be very much more easily destroyed by oxidizing agents and by vigorous chemical treatment than gastrin. Physiologically secretin and gastrin preparations also appear to be different. Thus Bayliss and Starling were not able to bring about gastric secretion by the injection of their secretin, and Keeton, Luckhardt and Koch have not been able to stimulate the pancreas to secrete by the injection of gastrin preparations. As stated previously, neither has been shown to stimulate the flow of saliva although a general vasodilation was observed. Biochemical studies by Hamill and Dixon also suggest very strongly that pancreatic secretin acts very specifically on pancreas tissue. Thus *in vitro*, pancreas tissue destroys secretin very rapidly, with the result that there is a partial activation of the proteolytic ferment in the pancreas tissue. This reaction appears to be a definite quantitative one and an active pancreas can destroy more secretin than an exhausted gland. So also if an *in vivo* injection of secretin is followed by an injection of pancreas extract the secretion of pancreatic juice is prevented. No other glandular tissue was found to be anywhere nearly as active in this destructive action as pancreas tissue.

The general conclusions which I consider can be made, at least tentatively, are that vasodilator substances are very widely distributed, that these in general act to some extent on digestive glands, that we do not know what these substances are, that we do not know whether they differ in character in different tissues, that we do not know whether secretins are among these vasodilators, that pancreatic secretin and gastrin appear to be closely related, but probably are not identical chemically and do not act the same way physiologically, and that these two substances appear to act specifically as secretagogues.

METABOLISM STUDY OF A CASE OF FROEHLICH'S SYNDROME—(DYSTROPHIA ADIPOSO-GENITALIS).*

By JACOB ROSENBLOOM, M. D., Ph. D., Pittsburgh.

In 1901, Froehlich¹ described a peculiar condition found in certain cases of hypophyseal disease. In these cases the hypophysis was injured or destroyed, in contradistinction to the cases where the hypophysis was the seat of tumor formation. The symptoms noted were: (1) Adiposity; (2) atrophy of the genital functions; (3) loss of secondary sexual characters, especially of the hair on face, axillae and pubes. This syndrome is now well accepted as a condition, the result of dyspituitarism, or a lessening of function of the pituitary gland.

This paper contains a study of the metabolism of a case of this kind. The patient was 35 years of age and presented all the features that are characteristic of this syndrome.

METHODS.

The patient received daily the following diet:

Whole milk	500 c.c.
Cream	300 c.c.
Eggs	450 grams
Horlick's malted milk	200 grams
Sugar	20 grams
Salt	6 grams
Water	2000 c.c.

This diet is purin free and yields approximately 2,830 calories, and contains about 139 grams protein, 146 grams fat, and 225 grams carbohydrates.

The experimental methods were the same as those described in previous publications.²

DISCUSSION OF RESULTS.

It may be noted that in the six days metabolism study there was a minus nitrogen balance of 0.30 grams. The amount of urea-nitrogen, ammonia-nitrogen, uric acid-, creatinin-, and undetermined nitrogen excreted are normal. The amount of nitrogen in the stool is also normal.

*From the Laboratory of Dr. Jacob Rosenbloom, Pittsburgh, Pa.

¹Fröhlich (Wien. klin. Rundschau, 1901, XV, p. 883).

²(Am. Jour. Med. Sc., 1911, CXLIII, p. 7; 1913, CXLVI, p. 731; 1914, CXLVIII, p. 65; 1916, CLII, p. 256; Arch. Int. Med., 1913, XII, p. 276; 1914, XIV, p. 263; Amer. Jour. Dis. Children, 1916, XII, p. 53).

TABLE NO. I. THE NITROGEN METABOLISM AND URINARY NITROGEN PARTITION

Date	Volume c. c.	Urine										Feces		Balance				
		Total nitrogen gm.	Urea nitrogen		Ammonia nitrogen		Uric acid		Creatinin ¹		Undetermined nitrogen		Nitrogen	Intake gm.	Balance gm.			
			Percent total nitrogen gm.	Percent total nitrogen gm.	Percent total nitrogen gm.	Percent total nitrogen gm.	nitro- gen gm.	Percent of total nitrogen gm.	Percent of total nitrogen gm.	Percent of total nitrogen gm.								
1914																		
March 7th	1490	15.0	12.6	84.0	0.49	3.3	0.63	0.21	1.4	1.21	0.44	2.9	1.26	8.4	1.4	9.3	16.1	-0.3
March 8th	1240	15.4	13.0	84.4	0.46	3.0	0.72	0.24	1.5	1.14	0.42	2.8	1.28	8.3	1.4	9.1	17.0	+0.2
March 9th	1100	14.8	12.3	83.1	0.41	2.8	0.66	0.22	1.5	0.89	0.33	2.2	1.54	10.4	1.4	9.5	16.0	-0.2
March 10th	1120	14.4	12.0	83.3	0.50	3.5	0.72	0.24	1.7	1.13	0.41	2.9	1.25	8.7	1.2	8.3	16.4	+0.8
March 11th	1130	14.7	12.2	83.0	0.45	3.1	0.81	0.27	1.9	1.13	0.41	2.8	1.37	9.3	1.2	8.2	15.9	0
March 12th	1020	14.9	12.3	82.6	0.57	3.9	0.75	0.25	1.7	1.12	0.41	2.8	1.37	9.2	1.2	8.1	15.3	-0.8

¹ Creatin was absent from the urine throughout the metabolism period.

TABLE II. THE SULPHUR METABOLISM AND URINARY SULPHUR PARTITION

Date	Urine												Feces		Balance	
	Sulphur	Total sulphate sulphur		Ethereal sulphate sulphur		Inorganic sulphate sulphur		Neutral sulphur		Percent of total sulphur	Sulphur intake gm.	Balance gm.				
		gm.	Percent of total sulphur	gm.	Percent of total sulphur	gm.	Percent of total sulphur	gm.	Percent of total sulphur							
1914																
March 7th	1.90	1.30	68.4	0.06	3.1	1.24	65.3	0.60	31.6	0.32	1.8	—0.42				
March 8th	1.70	1.50	88.2	0.10	5.8	1.40	82.4	0.20	11.8	0.32	1.9	—0.12				
March 9th	1.62	1.40	86.4	0.22	8.0	1.27	78.4	0.22	13.6	0.32	2.0	+0.06				
March 10th	1.61	1.30	80.7	0.12	7.4	1.18	73.3	0.31	19.3	0.30	1.8	—0.11				
March 11th	1.48	1.27	85.9	0.11	7.5	1.16	78.4	0.21	14.1	0.30	1.8	+0.02				
March 12th	1.32	1.05	79.6	0.11	8.4	0.94	71.2	0.27	20.4	0.30	1.9	+0.28				

TABLE NO. III. THE CALCIUM, MAGNESIUM, AND PHOSPHORUS METABOLISM

Date	Urine			Feces			Intake			Balance		
	Phosphorus gm.	Calcium oxide gm.	Magnesium oxide gm.	Phosphorus gm.	Calcium oxide gm.	Magnesium oxide gm.	Phosphorus gm.	Calcium oxide gm.	Magnesium oxide gm.	Phosphorus gm.	Calcium oxide gm.	Magnesium oxide gm.
March 7th	1.50	1.10	0.16	1.4	0.62	0.21	2.4	1.7	0.36	-0.5	-0.02	-0.01
March 8th	1.48	1.00	0.17	1.3	0.60	0.20	2.8	1.6	0.34	+0.02	0	-0.63
March 9th	1.56	0.96	0.14	1.2	0.61	0.21	2.4	1.4	0.37	0.36	-0.17	+0.02
March 10th	1.62	1.14	0.18	1.0	0.33	0.14	2.8	1.6	0.33	+0.18	+0.13	+0.01
March 11th	1.60	0.94	0.14	1.2	0.38	0.20	2.9	1.38	0.35	+0.10	+0.06	+0.01
March 12th	1.68	1.12	0.16	1.0	0.42	0.22	2.8	1.7	0.39	+0.12	+0.16	+0.01

TABLE IV. PERCENTAGE EXCRETION OF CALCIUM AND MAGNESIUM IN THE URINE AND FECES

Day	Percentage of total calcium oxide excreted in		Percentage of total magnesium oxide excreted in	
	Urine	Feces	Urine	Feces
1	63.9	36.1	43.2	56.8
2	62.1	37.9	45.9	54.1
3	61.1	38.9	40.0	60.0
4	77.6	22.4	56.2	43.8
5	71.2	28.8	41.2	58.8
6	72.7	27.3	42.1	57.9
Average	68.1	31.9	44.9	55.1

In the six days there was a minus sulphur balance of 0.29 grams. The total sulphate-sulphur, ethereal-sulphate sulphur, inorganic-sulphate sulphur and neutral sulphur in gms. and in percentage of the total sulphur is also normal. The amount of sulphur in the stools is also normal. In the six days metabolism study there was a retention of 0.16 grams calcium oxide and 0.01 grams magnesium oxide. There was a loss of 0.44 grams of phosphorus during this time. The percentage distribution of calcium oxide, magnesium oxide, and phosphorus in the urine and stools are also normal.

5737 Forbes Street.

CHRONIC GAS POISONING—A BRIEF BUT COMPREHENSIVE REPORT ON FOURTEEN CASES.

By WM. J. MCGURN, M. D., Boston, Mass.

While it is true that a number of reports on chronic gas poisoning have been published in journals of good standing, a search of our English medical literature leads one to feel that the subject still possesses an element of ambiguity inasmuch as an actual citation of a series of cases together with a description of their source of intoxication, mode of onset, progress, and ultimate results, is conspicuously lacking. This omission may have been due to the fact that, in cases of chronic gas poisoning the amount of data is usually so great, writers upon the subject have, for the lack of space, dealt with its generalities in lieu of drawing a definite word picture of individual cases encountered.

In submitting this report the writer will attempt to amplify the topic by a brief but accurate description of fourteen cases selected from the many that have come under his personal observation, without reference to the great number of cases collected from other reliable sources.

CASE I.

General toxic nerve irritations due to furnace gas. Dentist, aged 42, inhaled considerable gas from his furnace (at night only) for a period of about five weeks. After three weeks' exposure he began to suffer numbness in feet and hands, neuralgic pains in legs and arms, pain in heart, headache, nausea, occasional vomiting, and extreme nervousness. When seen at his home he was suffering from illusions and hallucinations of sight, with fear of impending death. The atmosphere in his sleeping room carried a distinct odor of coal gas, emanating from a hot air furnace. His removal to the country for a period of three weeks resulted in prompt and full recovery. Crevices and fissures between the fire-pot and hot air chamber were recemented and no further trouble has occurred. Two other persons similarly exposed from the same source were but slightly affected.

CASE II.

Combined central and peripheral nerve lesions due to illuminating gas. Motorman, age 39, slept in room immediately over basement in which was located an old gas meter with pin-point leak. He complained of dizziness, intense coronal headache, tenderness of scalp, numbness of his feet; and had suffered two epileptoid seizures, falling backward in the vestibule of his car. During the nine weeks he had lived in this house two canary birds had died in a room adjacent to his sleeping apartment. When first seen his patellae and Achilles tendon reflexes were somewhat diminished and after ten days' study they had become entirely abolished. All treatment failed until discovery and removal of the source of intoxication which resulted in slow but good

results. After six weeks his tendon reflexes had returned to normal, while the dizziness, headache, tenderness of scalp, and numbness of the feet had disappeared and no further convulsive seizures have occurred. One other person similarly exposed from the same source was not at all affected.

CASE III.

Combined cerebro-spinal and peripheral nerve lesions due to coal gas. Janitor, age 35, exposed to furnace gas from steam heating plant in a public school building where soft coal was used and a forced draught appliance of the non-consumer type was employed. Was exposed about three hours daily for three weeks before the symptoms began to appear in the following order: headache, irritation of the nose and throat, blurring of the vision, distress about the heart, numbness of the hands and feet, dizziness, burning of the fingers and toes, general weakness, quickened knee jerks, exaggeration of all tendon reflexes, asymmetry of facial musculature, pallor, impairment of pupillary light reflexes, mild optical illusions, lightning pains in the extremities, tenderness and weakness of muscles, hemic murmurs (cardiac), early morning languor, and nervous irritability. Improved hygiene and removal from all sources of intoxication has resulted in improvement of his general condition. Although fifteen months have elapsed since treatment began many symptoms remain and it seems highly probable that full recovery will not take place. His father who was exposed in much the same manner suffered from chronic bronchitis for several months with no other untoward results.

CASE IV.

Peripheral neuritis with tachycardia due to illuminating gas. Housewife, age 54, inhaled illuminating gas, from flexible gas tube, about three hours daily for three to four years. It is estimated that the amount of gas contained in the air did not at any time exceed, in this case, more than 1 part to 250,000. Her symptoms were: despondency with fear that something awful was about to happen, persistent languor, cardiac angina, also tachycardia, general weakness and finally spasm of the great muscles of the back. Elimination of the source of poisoning resulted in slow but marked improvement, the spasm of muscles and tachycardia being entirely relieved within six months after hygienic treatment began. This patient had listened to a diagnosis of "nerves" and "hysteria" from a number of reputable physicians and had visited two of our larger hospitals without encouragement or relief. Nearly every known therapeutic agent had been tried in this case without perceptible improvement. Her husband, who suffered marked mental impairment, has improved greatly since the source of their trouble has been eliminated.

CASE V.

Sharply localized peripheral neuritis with profound constitutional disturbances due to illuminating gas. Housewife, age 29, had inhaled an unknown quantity of illuminating gas from a leaky flexible gas tube connected with her kitchen stove. The exposure had been one or two hours daily for about seven months. When first seen the patient was suffering from severe headache, nausea, vomiting, illusions, hallucinations, insomnia, and extreme nervousness with temperature varying from normal to 103° F. with pulse of 130. The right thigh was in an adducted position and sharply flexed upon the abdomen. The patient was unable to move the right leg or thigh, and was crying out from intense pain in the region of adductor muscles, which were found to be in a rigid spastic state. Hypnotics, sedatives and narcotics of every kind were tried, also nearly every known local analgesic was applied, with absolutely

no relief. A five weeks' sojourn in one of our larger hospitals resulted in her discharge on crutches under the diagnosis of "hysteria." This condition continued for several weeks after removal to a place of better environment but finally yielded gradually to improved hygienic conditions.

CASE VI.

Permanent muscular weakness with cardiac neurosis due to illuminating gas. Physician, age 31, inhaled small amount of gas from extinguished pilot jet in his office for a period of two weeks and a considerable amount, on one occasion, while attempting to repair the fixture. Immediately following this he suffered intense headache, vomited several times, and complained of severe pain about the heart, which had developed a distinct hemic or functional murmur. For the next two weeks he suffered excruciating pain in the feet, legs, spine, back of neck, head, and heart; also sharp lancinating pains in the arms, forearms, and fingers, which were unrelieved by the most heroic therapeutic measures. Repair of the gas fixture resulted in slow but positive results. After six weeks of moderate exercise in the open air his cardiac murmur and neuralgic pains had disappeared. When he began to resume his practice he found that he had developed weakened arches. While it cannot be said that the patient has a fully developed "flat foot" the muscles of his feet are so weakened that he is unable to take more than a dozen steps without shoes and arch supports. More than one year has elapsed since he returned to practice but his condition remains unimproved and it seems unlikely that he will ever recover fully.

CASE VII.

Cerebrospinal irritations with repeated rigors due to coal gas from bakery oven. Girl, 21, employed by father in small bakery where the fumes of coal gas coming from the oven were at all times more or less perceptible. The patient complained of cardiac angina, chronic bronchial irritation, occasional frontal headache, nervous irritability, mental depression and repeated rigors without rise of temperature. The attacks of "chills" occurred at bedtime and usually continued for 10 to 20 minutes. Her pupils were dilated and almost immobile to light and accommodation with exaggeration of all tendon reflexes. Tonic and sedative measures of every kind were employed in an attempt to improve her condition but no relief was obtained until she was removed from the bakery, when, after a period of three weeks, all symptoms were improved with complete cessation of the rigors. After a vacation of two months the patient resumed her duties at the food shop and suffered almost immediate return of all symptoms. Several times her absence from the bakery resulted in alleviation of her trouble which promptly made its reappearance on her return. For the past six weeks the patient has been seeking relief at a local hospital without appreciable change of any kind. Her father and two sisters employed at the bakery suffered many symptoms known to be caused by the prolonged inhalation of gas.

CASE VIII.

Chronic invalidism due to inhalation of illuminating gas. Housewife, age 45, was asphyxiated by illuminating gas which permeated the house from a main-pipe leakage about ten years ago. Soon afterward she moved to her present place of residence where, until the past year, there had been a constant leak from several of the permanent metal gas fixtures. During that time the patient had been constantly under regular medical treatment, suffering from the following symptoms and conditions: headache, nausea, vomiting, constipation, anorexia and nearly every other manifestation of gastro-intestinal disturbance; also numbness, itching and burning of the extremities, accom-

panied by general weakness, mental and physical exhaustion, with neuralgic and stabbing pains distributed well over the body. She suffered from anemia, "phantom tumor," globus hystericus, polyuria, phlebitis, cardiac neuroses, insomnia, spasm of the great muscles of the back, occasional retraction of the head and impairment of the vision with unequally dilated pupils. Finally an intensive family study, together with the discovery of the gas leak, led to withdrawal of all medicines and removal of the patient to the sea shore, which has resulted in the one best year's health that she has had for the past decade. Although many symptoms of her neurotic condition still exist, there is no evidence at this time of any local or constitutional disease, and it is quite gratifying to know that she is gradually improving at her former abode where the old and leaky gas fixtures have been replaced. It is not at all probable that this patient will ever enjoy good health. At least three other persons suffered severe illnesses as a result of being exposed to gas from the same source.

CASE IX.

Case of petit mal due to inhalation of illuminating gas. Housewife, aged 28, began housekeeping five years ago; soon afterward began using gas iron for ironing shirtwaists, etc. Made use of this contrivance four or five hours each week. Soon afterward she began to have "dizzy spells," suffered pain about the precordium, severe frontal headache, and vomited occasionally. The patient became very nervous and was afraid to be left alone or to go out unattended. She felt that something terrible was about to happen and felt impelled by some mysterious force to jump out of the window but did not do so. After many months of suffering and numerous consultations with eye, ear, nose, throat, heart, and nerve specialists, it was discovered that her attacks of headache, vomiting, and dizziness usually followed the use of her gas iron. On further investigation it was found that while ironing, the flexible tube attachment frequent became kinked, which resulted in the burner being extinguished; consequently, before it could be re-ignited, considerable gas had escaped and was inhaled. The danger in further use of this device was promptly recognized and it was at once relegated to a better purpose as a fit contribution to the nearby junk heap. Suffice it to say that a few weeks' visit to one of our suburbs resulted in complete alleviation of all her symptoms. On her return to the city it was found impossible, on account of a nearby railroad and factory, both of which use soft coal to the production of considerable gas which permeated her house, to eliminate every source of gas from her home, so that she still suffers, in a much milder degree, most of her former symptoms. This patient has never presented a physical sign of any disease nor has she ever taken a dose of medicine that helped her in any way whatever.

CASE X.

High blood pressure and vasomotor disturbances due to furnace gas. Housewife, age 43, inhaled gas emanating from low chimney of nearby factory burning soft coal. In this case the odor of gas was so pungent that breathing, in the patient's apartments, at times was very difficult. As a rule, however, this condition of affairs did not exist for more than one or two hours daily. The patient had always been well, but three months after this menace commenced she became very restless, irritable and excited on slight provocation. Soon afterward it was noticed that she frequently became very pale, her usual ruddy complexion suddenly changed to a deathly pallor as often as eight or ten times daily. Her eyes became glassy and the muscles of the face were seen to twitch, while her lips, tongue and hands trembled. She complained of frontal headache, insomnia, shortness of breath, and was exceedingly restless. When

first examined by the writer her pulse was 84 and regular; her heart sounds were normal with the exception of a soft systolic murmur heard at the apex and base of the heart to the left of the sternum. Her urine was normal in amount with S. G. 1.010; the total urinary solids and urea were decreased to about 60 percent of normal. Her blood pressure was found, on repeated examinations, to be 285, measured with the Sanborn and Tycos instruments. A restricted diet was prescribed and the patient sent to Maine for a period of five weeks where she improved greatly. On her return her pulse was 70 and heart sounds normal; her urine, including S. G., total solids, and urea, was normal, and blood pressure was reduced to 155.

At this time her vaso-motor disturbances had entirely disappeared and her nervous irritability was much improved. One month after her return, however, nearly all of her former symptoms began to reappear, her blood pressure again rose to 270 and continued at that point until she was again removed to the country where she remained for the summer. In the meantime the factory had discontinued the use of soft coal and had made some important repairs on their power plant which resulted in elimination of gas from her house. On her return she appeared well in every way, with blood pressure of 140, and has since then continued to enjoy good health. Throughout her illness the patient's appetite was excessive. No less than five other persons were seriously affected by inhalation of gas from the same source, one of whom (a case of multiple neuritis) has never recovered.

CASE XI.

Convulsions followed by cataleptoid stupor caused by the inhalation of illuminating gas. Six years ago the writer was called to attend a case of clonic convulsions in a girl seven years of age. At the head of the bed, in a nine by eleven room, was a metal gas fixture which was leaking considerable gas. Suffice it to say that the convulsion was promptly relieved by the administration of ether, which was followed by a hypodermic injection of 1/12 grain morphine, but the patient immediately assumed a spastic rigidity of the muscles, bordering upon opisthotonos. This condition continued for about one week during which she was tube fed while bromides and morphine, in small doses, were administered per rectum. After ten days the patient regained consciousness but her mental stupor prevailed.

After six weeks in bed she had regained her normal repose and with no further developments she was sent to the country where she remained for several months. On her return to the city a soft systolic murmur, that had been present throughout her illness, had cleared and she has in every way continued in health at her home, where the leaky gas fixtures have been removed.

CASE XII.

Insanity due to prolonged inhalation of coal gas. Male, age 43, was employed as fireman at a power and heating plant where a forced draught appliance of the nonconsumer type was being tried out. On the afternoon of the first day that this contrivance was used he was overcome and carried from the boiler room into the open air. About one hour afterward a fellow workman also was prostrated in a similar manner. This resulted in the draft appliance being changed to one of the "consumer" type. Although the odor of gas was still perceptible, the amount was greatly lessened after the above-mentioned change was made.

About nine months afterward, while cleaning the flues of the furnace, the patient suddenly ran from the boiler room and through the establishment shouting and knocking over tables, desks, and other light furniture, as well as

several boys who happened in his way. He finally broke through an unused door and escaped upon the street. During the night he was found on a vacant lot in a dazed condition; later on he was identified and taken to his home by the police, where he remained for several days until apparently he had fully recovered.

For the next two years the patient was employed as a teamster and enjoyed good health and appeared normal in every way. About eighteen months ago he gave up the team and secured a job as fireman in a candy factory where another forced draught appliance was in operation; at this place also the fumes of gas were constantly noticeable. For the first month or so he got along nicely, then began to complain of headache and vomited considerable; he became restless at night and was often delirious in his sleep. His appetite was excessive and his memory poor; he had frequent fainting spells and complained of pain about the heart. He developed a blank, vacant, facial expression and complained that everything seemed to be so far away, also that gigantic animals appeared to be approaching from a great distance. Mountains arose before him in the distance while the familiar faces of his friends became hideous sights from which he shrank. This condition continued until one morning about ten months ago he secreted himself in a closet, refusing to come out, shouting and saying that he had committed serious crimes and that he wanted to be executed. An examination resulted in his being committed to one of our state institutions where it is said, upon good authority, that he has improved greatly without treatment of any kind other than hygienic. At the present writing the cause of his disturbed mentality is still in question and the diagnosis deferred. "During the two years that followed this man's first exposure, no less than ten other men were seriously affected by the inhalation of gas at that place, so that finally the forced draught appliance was given up and an adequate, natural draught secured by the building of a new and larger chimney. Since then but little gas has escaped into the workrooms and no new cases have developed." The above quotation is from a statement made by the chief engineer (a man of thirty-five years' experience) who attributes his own symptoms of multiple neuritis to the inhalation of coal gas. He also said that he knew of a great many stationary engineers who suffered from "pain in the heart and rheumatism" from being poisoned by gas, and expressed the opinion that "no man could be exposed to coal for more than two or three years without suffering for the remainder of his life."

CASE XIII.

Glycosuria and "pseudotabes" (multiple neuritis) due primarily to the inhalation of coal gas. Merchant, at the age of 41, began his residence under the same roof and was exposed to gas from the same source as Case 10. He had always been in good health and had, six months prior to the beginning of his exposure to gas, been accepted as a "class A risk" by two of our old line companies for heavy life insurance. Soon after taking up his residence at the place of exposure he began to sleep poorly, was exceedingly restless and uncomfortable while in bed; he soon complained of his flesh being sore and tender. On one of the occasions that he noticed the odor of coal gas was exceedingly pungent in his sleeping apartment, he rose late and felt weak and bad; he was suffering intense, coronal headache; he was nauseated; his breathing was labored and for the first time he was passing a great amount of urine that was light in color. On the afternoon of that day the writer saw him and examined his urine which was found to contain about 12 percent of sugar with a S. G. of 1.038. Without knowledge, at that time, of the patient's exposure to gas, the writer began treatment of the case along rational dietetic

lines and entered upon a study of the cause of the sudden appearance of such a high percentage of sugar, none of which was found present six months before.

As time went along the patient grew worse and broke away from his diet and other "hygienic" measures; he partook of all good foods and said he felt better when he did so. Attempts at rigid dieting affected his memory and mental capacity generally and caused him to complain of great weakness and inability to do his regular office work. At this time he sought treatment elsewhere so that for a period of two years the writer had lost sight of him. About two years ago the writer was again summoned and examined the patient at his home, where the odor of coal gas was promptly detected. The history was then obtained of prolonged inhalation of coal gas which permeated the house. On examination the right pupillary light reflex was found to be impaired; he was pale and anemic; his heart sounds were clear with the exception of a soft systolic murmur best heard at the base, the sounds were indistinct and the patient was covered with cold perspiration. His pulse varied from 84 to 100 on slight exertion; his weight had been reduced from 195 to 158 lbs. His muscles were shrunken and his strength greatly impaired; his skin and flesh were hypersensitive to the touch while the patellae and Achilles tendon reflexes were absent. Sensation was greatly impaired in either leg and foot while the plantar reflexes were absent, due to anesthesia of these areas. On questioning the patient he said that for the past year he had suffered numbness and burning of his feet and legs, most pronounced in the early part of the night and that these symptoms were usually followed by sharp lancinating pains that were most agonizing; also that he suffered much from short stabbing pains in the fingers of either hand and from most excruciating pain in his heart and chest. Occasionally there had been sharply localized bands of pain at the wrists, while for a time he had been subject to attacks of lightning pains everywhere in the body. I would add that the story of constant suffering that came from the lips of this man was the most lucid and graphic account of intense mortal anguish that the writer has ever heard.

Immediately following this consultation the patient was removed to a local sanitarium where he made fairly rapid progress toward recovery, but on account of his hypersensitive condition he was unable to derive full benefit from the hydro-, electro-, and mechano-therapeutic measures that were at his disposal. At the end of six weeks his knee jerks and other tendon reflexes had returned but not to normal. His right pupil had returned to normal and his strength and weight had improved. On his return he abandoned his former place of abode and secured quarters that were better suited to his physical welfare. During the eighteen months that have since elapsed he has gained slowly but constantly; he now weighs 175 lbs., his color and memory are good, his appetite normal, and his sight no longer troublesome nor his sleep disturbed. He is again able to attend all of his business affairs and suffers but little pain or discomfort. He is still weak and when exhausted from overwork or exposure his pains return, but in a much less degree and are of much shorter duration than before. He now partakes of a well mixed diet and manages to keep the urinary sugar to about 2 percent.

While it cannot be expected that this man will fully recover, it can be said that there has not been one month out of the last eighteen that he has not shown definite improvement in some way. Being a man of education and naturally a good observer, he now has great respect for the danger from gases of any kind and has become very emphatic in his claims that "even the slightest exposure to minute traces of coal or illuminating gas or to the odor of gasoline or its by-products of combustion, always cause him to suffer to a greater or less degree as a result."

CASE XIV.

Multiple sclerosis due to furnace gas. Electrician, aged 26, inhaled gas from an improperly cemented hot air furnace during his sleeping hours for about two weeks, when he began to complain of numbness of his feet and legs. One week later his legs began to shake and tremble and he then found it difficult to walk without support. Until that time the amount of gas inhaled is believed to have been small. On or about the 27th or 28th day of his exposure he inhaled a considerable quantity of coal gas, from the same source, and immediately began to suffer the following symptoms: headache, marked impairment of vision with almost complete blindness in his right eye, optical illusions and hallucinations, insomnia and delirium; also cardiac angina, fibrillary twitching and clonic spasms of the muscles of the extremities, followed by a convulsive seizure. On examination his face was found to be flushed, his breathing rapid, and mucous membranes slightly cyanosed; his pulse was rapid but regular. There was impairment of the left pupillary light reflex while the right pupil was immobile to both light and accommodation. Auscultation revealed the presence of a loud systolic murmur that was heard all over the cardiac area, and roughening of the respiratory sounds.

On further examination his patellae and Achilles tendon reflexes were found to be markedly exaggerated; there was well marked ankle and patella clonus while all of his deep reflexes were quickened and exaggerated. There was impairment of sensation over the feet, legs, and thighs and that part of the back below the fifth lumbar segment; there were areas of anesthesia well distributed over the body with the result that the plantar and cremasteric reflexes were absent.

During the next few months the patient was the subject of great interest and intensive study. Six months after the beginning of his exposure his weight had been reduced from 168 to 120 lbs. He had lost strength rapidly and was confined to a wheel chair. He had become profoundly anemic, with marked atrophy of the legs, thighs, right arm and left forearm. The vision in his left eye was diminished from 20/20 to 20/50 while that of the right was reduced to 20/400.

Ophthalmoscopic examination revealed optic disks that were moderately edematous, while blanching of the right upper and left lower temporal sides had become distinct. There was irregular, concentric, narrowing of the fields of vision, while either field was represented by about 1/5 its normal area. At this time he was unable to read, write, or to stand unsupported, while the superficial and deep reflexes remained about as above mentioned, ankle and patella clonus being well marked at all times. At this time the patient was removed to the country, where he began to improve. After two years of improved hygiene he is now able to write a very good hand, his intention tremor and fibrillary twitching of muscles having disappeared. He is now able to walk with but one cane and has gained strength and weight to 142 lbs. His sight is somewhat improved but not greatly. His speech, which was affected, has returned to normal. The hemic or functional heart murmur, which continued for many months, has finally disappeared. While this young man is still unable to do work of any kind, it can be stated positively that there has been no remission and he is gradually improving; also that the intensity with which this case was studied leaves no possible doubt as to the disease from which he suffers nor the source from which it resulted. Four other persons were exposed to a similar amount of gas from the same source, none of whom suffered more than mild, transitory, ill results. (A full report of this case was published in *Medical Record* of Jan. 27, 1917.)

At first it was the writer's intention to submit a greater number of cases, but owing to the space required, it was deemed expedient to limit this report to a description of the above cases, which were carefully selected for the following reasons: First, they are all chosen from families who represent that type of American whose occupation, mode of living, environment, and essentially every other sociologic condition, suggest, at least, the average amount of intelligence. Second, because of the freedom of their personal and family histories from acquired or hereditary diseases that might obscure or complicate a rational diagnosis. Third: because of the opportunity the writer has had for intensive family study in each case involved (he has, with the aid of others, been able to eliminate the possibility of any of these cases being due to other causes). Fourth, because they represent not only a wide range of nerve lesions but also involve a considerable number of the sources from which chronic gas poisoning is likely to be acquired, and finally, because of the remarkable facts associated with each case.

From these and many other cases seen by the writer it is apparent that the amount of gas necessary to produce the most profound nervous disorders is exceedingly small, indeed so small that many men and women of experience and education have been permanently injured owing to the fact that they have failed to appreciate (frequently after having been warned) the grave dangers that always exist when coal or illuminating gas is inhaled in quantities sufficient to be detected by the normal sense of smell.

While it appears that ample proof has been furnished that carbon monoxide is the chief offender contained in coal and illuminating gas, it does not appear, from these cases or from the full experience of the writer, that coal gas, which contains not more than 10 percent of carbon monoxide, is less toxic than illuminating gas, containing a much higher percentage of that toxic agent. Moreover, if we are to give to Yandell Henderson and others full credit for their experimental work in demonstrating the "nontoxic" action of pure carbon monoxide¹ upon the human body, such credit must result in the acknowledgment that coal and illuminating gas contain other bodies that contribute greatly to the avid affinity with which carbon monoxide embraces the blood and nerve tissues, for there is overwhelming proof that both coal and illuminating gas have often produced widespread irritative and chronic degenerative changes in the central and peripheral nervous systems, when present in quantities positively too small to interfere materially with the amount of oxygen inhaled.

¹Made from formic acid.

NOTES ON THE TREATMENT OF HAY FEVER.

By WILLIAM SCHEPPEGRELL, A. M., M. D.,

President American Hay Fever Prevention Association; Ex-president American Academy of Ophthalmology and Oto-Laryngology; Chief of Hay Fever Clinic, Charity Hospital, New Orleans.

The success of pollen therapy is greatly influenced by the physician's judgment of the individual cases. If a pollen extract is used, the one should be selected which belongs to the group of plants to whose pollen the patient is not only sensitive, but to which he is exposed. This will give more probability of producing good effects than an extract composed of many pollens of different kinds and degrees of toxicity.¹

While it has been maintained that new sensitizations are not induced by including the extracts of pollens to which the patient has not previously been sensitive, this cannot be definitely established until a sufficiently large number of cases have been tested. One of the test subjects connected with our biological laboratory, who was formerly sensitive only to the ambrosia (ragweed, etc.) group, after many tests with various forms of pollen extracts, has developed a marked sensitization to the gramineæ (grass) group. While it is possible that this subject may have developed this sensitization from other causes, the natural inference is that it was the result of repeated tests with the gramineæ pollen.

Independent of the risk of developing a new sensitization, it is clearly more advantageous to inject, when practicable, only the pollen extract to which the patient is sensitive and exposed.

In these cases the extract need not be limited to the actual *species* of pollen to which the patient is exposed, as these vary so greatly in different places that it would require a special pollen extract in every locality in which hay fever is found. Frequently, also, the patient is exposed to several varieties of the same plant family which would further complicate the treatment.

From a course of investigations² dating back to 1907, we have found that hay fever pollens may be biologically or morphologically divided into four principal groups, which include all the principal toxic pollens.³

These are as follows:

PRINCIPAL GROUPS OF HAY FEVER POLLENS.

- (1) The ragweeds (*Ambrosiaceæ*), (2) grasses (*Gramineæ*),

¹"Toxicity" here refers to the positive reaction in hay fever subjects. The existence of a true toxin in these pollens is still under investigation.

²The Immunizing Treatment of Hay Fever, W. Scheppegrell, M. D., New York Medical Journal, Dec. 4, 1909.

³Boston Medical and Surgical Journal, June 28, 1917.

(3) wormwoods (*Artemisias*), and (4) chenopodiums (*Chenopodiaceæ*).

The first includes not only the common ragweed (*Ambrosia elatior*, Fig. 1), giant ragweed (*Ambrosia trifida*), and Western ragweed (*Ambrosia psilostachya*), but also the "false ragweed" (*Gærtneria*), marsh elder (*Ivas*), and cockle burs (*Xanthiums*). The golden rod (*Solidago*) and many other members of the Compositæ family, although not wind-pollinated, and therefore not caus-



Fig. 1.—Pollen of common ragweed (*Ambrosia elatior*). Magnified 500 diameters. Size, 15 microns. Principal cause of hay fever in the eastern and southern states. Characteristic in appearance and reaction of the *Ambrosiaceæ* group.

ing hay fever except on direct inhalation, resemble the *Ambrosiaceæ* group biologically and morphologically.

The second group (*Gramineæ*) includes practically all the members of the grass family (Fig. 2), including the cultivated cereals, such as rye, wheat, and corn. From the standpoint of pollen therapy, this is fortunate, as there are nearly 5,000 species of grasses.

The wormwood (*Artemisia*) group is composed of about 200 species. Our investigations have shown that these represent the

important factor in hay fever in the Pacific and Rocky Mountain states. The pollen of all the species bear a close resemblance, not only microscopically (Fig. 3), but also in their hay fever reaction, which is ten times more active than that of the common ragweed (*Ambrosia elatior*).

The chenopodium (*Chenopodiaceæ*) group includes the chenopods (*Chenopodiums*), careless weeds (*Amaranthus*, Fig. 4), docks (*Rumex*), and water hemp (*Acnidas*). This group is of minor im-

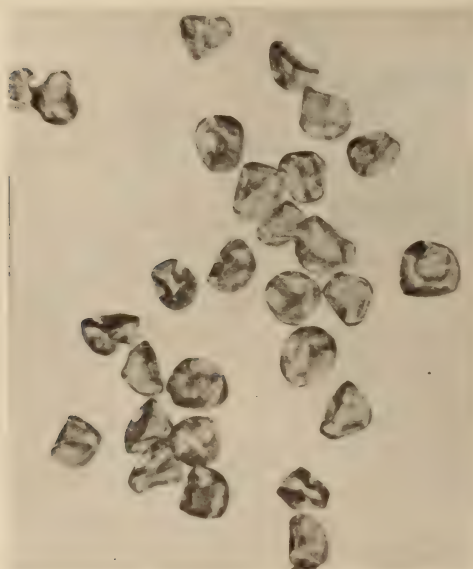


Fig. 2.—Pollen of June grass (*Poa annua*). Magnified 500 diameters. Size 22 microns. Principal cause of vernal hay fever. Characteristic in reaction and appearance of the *Gramineæ* group. The pollen of the group vary in size from 20 microns to 80 microns (corn pollen).

portance compared with the others, not only on account of the less active hay fever reaction, but also on account of its more restricted geographical distribution.

PRACTICAL APPLICATION OF THE HAY FEVER GROUPS.

If a patient is found sensitive to the pollen of the foxtail grass (*Chætochloa glauca*), our investigations have shown that he will also react to the pollen of other members of this group. The ex-

tract may, therefore, be prepared from the foxtail grass (*Chætochloa glauca*), timothy (*Phleum pratense*), rye, or other members of this group, or a combination of several of these.

In the same manner, if the patient is sensitive and exposed to the common ragweed, he may be treated with its extract, or that of the giant ragweed (*Ambrosia trifida*), marsh elder (*Iva ciliata*), or other members of this group or their combination.

While the golden rod (*Solidago*) is not wind-pollinated, and can-

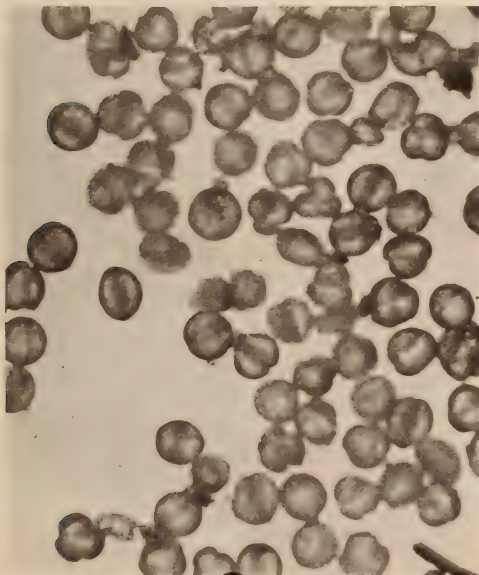


Fig. 3.—Pollen of mugwort (*Artemisia heterophylla*). Magnified 500 diameters. Size, 20 microns. Important hay fever pollen of the Pacific and Rocky Mountain states. Characteristic in appearance and reaction of the *Artemisia* group.

not, therefore, cause hay fever except on direct inhalation or excessive exposure, as when used for room decorations, its pollen resembles that of the ragweed morphologically and biologically, and its extract may therefore be used in combination with that of the ragweeds, which is the case with some of the commercial pollen extracts. The only objection is that it tends to perpetuate the popular myth that it is a cause of hay fever.

In most cases the skin reaction is a fair index of the susceptibility of the patient to pollen inhalation. It is, therefore, also a con-

venient method of checking the effects of the prophylactic injections. When the skin reaction disappears, which may occur after the fifth to twentieth injection, the treatment may be discontinued if the hay fever season is far advanced, or the injections made at longer intervals if this is not the case.

In testing our patients at the hay fever clinic of the Charity Hospital, we use the extracts of the different pollens separately. In the gramineæ (grass) group, for instance, we have the sweet



Fig. 4.—Pollen of careless weed (*Amaranthus spinosus*). Magnified 500 diameters. Size, 20 microns. Characteristic in appearance and reaction of the pollen of the *Chenopodiaceæ* group.

vernal (*Anthoxanthus odoratum*), rye, meadow (*poa annua*), timothy (*Phleum pratense*), and orchard grass (*Dactylis glomerata*). This is done in order to observe the different reactions, if any, in these varieties, but prophylactically and therapeutically we make no distinction between the grass extracts, using them either separately or combined.

The tests are applied to the nasal mucosa, the conjunctival sac,

or the skin. In cases in which the hay fever has already developed, the skin method alone is applicable. The extract may be applied to the scarified skin, or preferably injected into (not under) the skin (intradermic). Some of the commercial houses are offering individual syringes with capillary tubes containing the extracts, which are convenient for this purpose.

In addition to the pollen extracts which we prepare in our biological laboratory, we are using the extracts prepared by the large pharmaceutical houses. These extracts are standardized, and dispensed in convenient form for use. Care, however, should be used, as explained above, in the selection of the cases.

The degree of immunity resulting from active immunization has not yet been decided. In most cases the treatment should be repeated the following season. Our oldest record is a case treated in 1907 and 1908 for rag weed (*Ambrosia*) hay fever, in which there has been no occurrence, although, as a cotton planter, he is greatly exposed to the rag weeds. His son, aged 20, developed hay fever during the past season.

OTHER METHODS OF TREATMENT.

The *calcium chloride* treatment is also used in our hay fever clinic. The effects of this salt has been variously attributed to its sedative effect on the nervous system, increasing the coagulability of the blood, increasing phagocytosis and the functioning of the cell nuclei and leucocytes. While we have not yet completed our investigations on this subject, we have found the results of the treatment effective in a sufficient number of cases to continue the treatment this season. It has been found especially useful in patients who are not in a position to take the pollen treatments, which require the injections to be made at intervals of two to five days. The dose is 15 grains of the crystallized calcium chloride in water three times daily with meals. The treatment, as in the pollen therapy, should be commenced at least six to eight weeks before the hay fever season commences. It may be used even when the nature of the patient's sensitization is not known.

In cases in which the urinalysis shows marked acidosis, sodium bicarbonate may be used both internally and in the nostrils.

In the cases which have not responded to the prophylactic treatment, autogenous vaccines should be used. In making the culture it is important that the secretions be obtained not only from the nostrils, but also from the nasopharynx. Vaccine therapy is an excellent adjunct to the pollen therapy, and has given good results even when the pollen therapy has been omitted.

When it is impracticable to obtain the autogenous vaccines, the stock vaccines may be tried, using the influenza bacillus, the pneumococci, staphylococci, streptococci. While our experience with

these has not been as satisfactory as with the autogenous vaccines, we believe this to be partly due to the fact that in most of the commercial vaccines there is a large proportion of the staphylococci and streptococci, while our investigations have shown that this is not the case in the nasal secretions of hay fever subjects. The following formula is preferable:

- 400 million killed *B. Friedlander*.
- 400 million killed *m. catarrhalis*.
- 40 million killed *pneumococcus*.
- 50 million killed *streptococcus*.
- 60 million killed *staphylococcus aureus*.
- 50 million killed *staphylococcus albus*.

We are keeping careful record of the cases treated at our hay fever clinic. At the end of the present season we will report our observations, based on a larger number of cases, of the relative benefit of the various methods of treatment.

It should not be forgotten, however, that the elimination of the hay fever weeds generally, and especially in the neighborhood of the patient's residence, is an important adjunct to the control of hay fever. With the grass (*Gramineæ*) and chenopodium (*Chenopodiaceæ*) groups, whose potential area is not excessive, this has already produced excellent success in several cities.⁴ With the rag weeds (*Ambrosias*), however, the buoyancy of the pollen (15 microns) is so great that it will infect cities from the surrounding country. Until this can be controlled by legislative methods, fall hay fever will continue to some extent. On this account, patients suffering from this distressing disease should be given the benefit of our best efforts, both prophylactically and therapeutically, to relieve their sufferings.

⁴A Year's Work in Hay Fever Prevention in the United States, Wm. Scheppergrell, M. D., Journal of American Public Health Association, Feb., 1917.

X-RAY THERAPY OF UTERINE CANCER.

By EMIL H. GRUBBE, B. S., M. D., Chicago.

I do not propose within the limits of this paper to attempt to deal with the whole subject of x-ray therapy of uterine cancer. I intend to offer merely a few general remarks pertaining to this treatment and to call attention particularly to the class of cases which may be suitable for its application.

In the early days of x-ray therapeutics the treatment of internal cancers with this agent met with considerable opposition and skepticism. As a pioneer in this field, I well remember the criticisms which were heaped on not only the x-ray method of treatment, but also on the judgment and reasoning ability of those who dared work in this line.

Fortunately at the present time sufficient evidence—in fact, conclusive evidence—has been brought forward to show that x-rays are of value in the treatment of internal cancers, and particularly is this so of certain phases of cancer of the uterus.

It is well to understand that x-ray treatment of uterine cancer is, like every other therapeutic measure used in this condition, somewhat limited. When x-rays are used exclusively, they will not cure except when the disease is still localized. Patients showing regional—i. e., gland involvement—are not favorable subjects, and therefore strictly curative effects should not be expected in these cases. The same can be said for cases which exhibit cancer cachexia. No therapeutic agent known today should be expected to cure such cases.

We shall also do well to remember that, in cases deemed suitable for x-ray treatment, the x-ray is seldom used all by itself; certain surgical procedures should be used in order that the best ultimate results may be obtained. Furthermore, as most cases referred for x-ray therapy belong, as a rule, to the hopeless or inoperable class, in which the chance for cure is very remote by any method of treatment, it is wrong to suppose that x-ray treatment will produce magical curative results.

Conservative x-ray operators do not claim that the x-ray is the sole agent for the treatment of cancer, but they do claim that, at the present time, enough cases have been under observation for a long enough period of time to allow us to state that x-ray treatment of uterine cancer is of considerable importance, and should therefore demand our careful consideration. Medical literature records a large number of clinical cures and quite a few absolute cures. Re-

liable observers have made these reports, and so they should not be questioned. The difference in results, as observed in present-day reports, when compared with those of several years ago, is due to a better understanding of the subject. Today we select our cases and at the same time use a better technic.

Surgery, as an exclusive means for eradicating uterine cancer, is not so successful that we can afford to neglect the aid which other therapeutic agents may offer. Conservative gynecological surgeons state that 50 percent of all cases of cancer of the uterus come too late for ideal operative work, and of the operable cases only 50 percent are symptomatically cured following the use of the knife and actual cautery. This would indicate that the usual surgical measures need considerable assistance.

The surgeon must not ignore the fact that the x-ray is a powerful remedy which can be used following surgical operations in uterine cancer to make recovery more sure and also more rapid. Surgery can assimilate the therapeutic properties of the x-ray without losing one iota of credit. The x-ray aids surgical procedures—it does not supplant them. With the help of the x-ray the surgeon will do many things which he could not do before.

To be permanently successful, any method of treating uterine cancer must completely do away with every cancer cell. It is a well-known fact that surgery cannot make certain of the removal of all cancer tissue, much less every cancer cell. Therefore some other agent which will reach out, find, and destroy these isolated, distant cells must be used in order that the outcome of treatment may be good.

The knife, the cautery, electric desiccation, even radium compounds, are undoubtedly valuable and necessary agents in the therapy of cancer. But all of these are purely local remedies, while the x-ray is a regional remedy—i. e., its therapeutic effects can be spread out over a vast area as compared with the aforementioned agents. Uterine cancer, when diagnosed, is usually regional—has gone beyond the stage when it could be considered a local disease; therefore logically the indications for x-ray therapy are very frequent.

It has been proved over and over again that the x-ray exerts specific influence over cancer tissue. Cancer cells absorb x-rays more readily than do normal cells, and they are consequently made less resistant to the inhibiting and destructive effects of these rays. Cancer cells are changed to connective tissue cells under x-ray influence.

The discovery that filters, especially those composed of metal, would practically protect the skin from x-ray burns was of great importance in advancing the subject of the use of x-rays in gynecology. By the aid of this discovery very large doses of the rays

can be given through the skin and other healthy tissues without seemingly affecting them detrimentally. I wish, however, to caution you not to conclude that the use of filters makes x-ray treatment absolutely fool-proof; that it is only good and never harmful. Now, more than in the past, greater skill and judgment are required in giving x-ray treatment.

There are three classes of uterine cancer in which x-ray therapy may be used:

The *first class* comprises those cases of primary or local cancer, which, because of heart disease, constitutional disease, or because they absolutely refuse surgical measures, cannot receive the benefits of surgery.

The *second class* includes all postoperative cases. In this class the x-ray is used as a prophylactic to prevent the possible recurrence of the cancer.

The *third class* consists of the inoperable and hopeless cases. In this class the x-ray is used for its palliative effects.

As regards exclusive x-ray treatment, epithelial cancers offer better prognoses than carcinomatous growths; also, carcinomata are more amenable to this treatment than sarcomata. Cancers localized in the body of the uterus, and not involving adjacent tissues, are less malignant than those located in the cervix, and consequently offer better prognosis.

The knife always has been, and properly so will be, considered the first and quickest means for the removal of localized cancer, but if, for any reason, surgery cannot be used, then x-rays should be used. It seems to be a matter of fact that there always will be a large number of women with cancerous uteri who will absolutely refuse the benefits which surgical measures may have to offer. For these women other methods of treatment must be available. X-ray treatment offers much, and should be advised to patients in this class.

The high operative mortality and the poor end results in most surgically treated cases of uterine cancer have caused the laity to keep away from the surgeon so long that, when the average case finally arrives, it is so far gone that we must classify it as inoperable and hopeless for any kind of treatment.

It should be assumed that all cancers will return, no matter what therapeutic agents are resorted to in removing the tumor. The return of the cancer is the rule—not the exception. For this reason prophylactic x-ray treatment should be given in every case subsequent to the operation. This is so serious a problem that *no exceptions ought to be made*. How often we hear that in a given case the removal of the entire cancer mass as well as the adjacent lymphatics was accomplished, and yet the patient died from cancer. The limitations of surgery are due primarily to the fact that the

knife or the cautery are purely local methods of treatment, and do not cope with the metastases, except as they may be found near the main operating field. The most capable surgeon will find that it is simply impossible to remove every gland involved, no matter how radical the operation. X-rays, on the other hand, can be used in as many separate localities as may be deemed necessary, and thus all metastatic areas can be placed under treatment. It would appear, then, that, no matter how radical any operative procedure may be, it should be followed by intensive x-ray treatment. Only in this way will the case receive adequate treatment. Only in this way will we do our whole duty, not only to the patient, but to surgery.

When used postoperatively, x-ray treatment should be started as soon after the operation as is possible. Inoperable as well as borderline cases should all be given the benefit of x-ray therapy. This is practically the only treatment which can be relied on to ameliorate the most disagreeable symptoms, and at the same time gives the patient a chance for at least a symptomatic cure.

I have been able to obtain symptomatic cure of well-established uterine cancers even with extensive involvement of the adjacent lymphatics. These cases have, however, been few. Occasionally I have been able to produce results which appeared most brilliant. Let me cite just one case. Nearly twenty years ago Drs. Bailey and Shears referred a woman to me for x-ray treatment. She had been operated upon. An exploratory laparotomy had been performed, and a carcinoma was found involving the fundus of the uterus and adjacent parts. She was in such physical condition that it was thought best not to go on and excise any of the diseased parts. Her condition was absolutely hopeless. After a number of x-ray treatments a very decided x-ray reaction was produced. This, together with the otherwise poor state of the patient's health, caused us no end of worry. After several months' time, however, she began to improve, and then (all the improvement having been credited to the previous heroic treatments) we once more placed her under the x-rays. After again producing a cumulative effect, the patient was discharged symptomatically cured. She is living today. There has been no sign of recurrence in all these years. This case taught me a very important lesson. No matter how gloomy the prognosis, we should consider it our duty to go on with treatment, for we may turn a seeming therapeutic failure into the most startling success.

Now, what can we say for those cases which come to us with cachexia? Naturally, it should not be expected that a patient with general carcinosis can be treated with x-rays in such a manner as to remove all symptoms of the disease. Usually the tumor can be checked in its growth, pains can be relieved, foul discharges lessened, hemorrhage controlled, the appetite improved, and in general the patient made to feel stronger. We should be thankful that

a remedy is available which can cope with at least some of the symptoms of the disease when it has reached this stage.

Cases which are symptomatically cured under x-ray treatment should never be discharged, but kept under observation for years. Relapses occur, but, if taken in time, these may be checked rapidly, whereas, if treatment is delayed, the case may get beyond the reach of the remedy.

In conclusion, it may be stated that, while much still remains to be ascertained, enough has already been learned to prove that x-ray therapy is a valuable addition to the gynecologist's armamentarium in the treatment of uterine cancer.

130 North State Street.

TEAMWORK IN CHRONIC ARTHRITIS IN THE STANFORD CLINIC.*

By LEONARD W. ELY, M. D., San Francisco.

In a general way the Orthopedic Department has charge of cases of chronic arthritis at the Stanford Clinic, and the change in our conception of these cases has brought it about that the department is really little more than a clearing house for most of them. The orthopedic problem in many of them is to find out their cause, and then to send them to the appropriate clinic for the removal of the cause. From our histories we have banished such terms as "chronic rheumatism" and "arthritis deformans." They are vague, confusing, and conducive to mental inertia.

We recognize but two elements in the causation of chronic arthritis, namely infection and trauma. The traumatic cases, including those due to chronic strain, we retain in the Orthopedic Department. We retain also tuberculous and syphilitic arthritis.

In joint tuberculosis, we follow as our two cardinal rules of treatment deprivation of function and avoidance of secondary infection, coupled with hygienic measures. The deprivation of function in children's joints is generally carried out on conservative lines, in adults on radical. We realize that there is a focus of infection somewhere else in the body, but we are powerless to eradicate it, and must rely in our treatment upon measures directed to the joint itself.

With syphilitic joints, the case is different, and the treatment may be said to be based upon the eradication, not of a distinctive focus, but of a general infection in the body. The treatment is exclusively general. We discard apparatus and operative measures, and rely upon mercury, the iodides, and salvarsan. Syphilitic arthritis is more frequent than it was formerly thought to be. The diagnosis is often extremely difficult. The Wassermann test is suggestive, not final, and we are wont to depend chiefly on the therapeutic test for our decision. In fact both syphilis and tuberculosis belong to a great group of the infectious arthritides whose members often cannot be distinguished with certainty from one another. All have similar pathology, physical signs, symptomatology, and roentgen picture. Each has certain peculiarities, but these peculiarities may not be well marked in any individual case, and we may only reach a definite diagnosis after long study. It is this difficulty in diagnosis which is responsible for the many "cures" of joint tuberculosis, and

*Read before the San Francisco County Medical Society, Dec. 5, 1916.

for the former vogue of iodide of potassium in so-called chronic rheumatism.

In this group belong also many of the chronic arthritides due to infection of the genito-urinary tract, of the tonsils, or of the jaws, though infections of the jaw seem to give rise by preference to a type of arthritis differing radically in its pathological characteristics, that is to a type group known as hypertrophic, degenerative or osteo-arthritis, "arthritis deformans" of the Germans.

In our search for the cause of the arthritis, we look chiefly for infections of these three regions, and if an infection be found, we transfer the cases forthwith to the appropriate clinic. It becomes thereafter a problem for the dentist, the laryngologist, or the genito-urinary surgeon, or for them all, and the orthopedic clinic acts largely in a consulting capacity, although it carries out measures to lessen discomfort, such as Bier hyperemia, heat and massage. We think that drugs are useless, internally and externally, though in this we realize that we have good authority against us.

Dr. Dickson and I attempted a series of experiments of withdrawing fluid from these inflamed joints and injecting it into rabbit's bone marrow, but the results were barren.

The proportion of cases in which a focus of infection has been found is astonishing. I have collected the histories of 121 cases of focal infection with arthritis.¹ In some, two or three foci were observed. Contrary to my preconceived opinion, the teeth lead off with sixty-seven cases, then comes the genito-urinary tract with forty-five cases, then the nose and throat with twenty-four cases. Only scattering cases in other organs have been noted. I admit here, of course, that the presence of a focus of infection in a patient with an arthritis is no evidence that one is the cause of the other. We base our notion of cause and effect mostly on three grounds: First, the work of various investigators who have recovered micro-organisms from these chronic arthritides; second, the practical identity of these obscure arthritides in their pathological and symptomatological characteristics with others, such as tuberculosis and syphilis, which are known to be infectious; third, the response to treatment.

Some cases resist all treatment on the lines that I have indicated; others improve markedly, while still others recover completely. Often we find it advisable to put the patient in the hospital for a while in order to make a thorough study of his case.

The problem of chronic arthritis tackled as we are tackling it, instead of being a dull and hopeless one, as it was a decade or so ago, is now an interesting and hopeful one. Teamwork is necessary to get good results, and someone with the requisite enthusiasm and patience must drive the team.

¹An exhaustive analysis is being made of these cases, and probably will be published shortly.

The discussion of this paper by my collaborators furnishes the chief interest in this common piece of work.

CASES WITH A FOCUS OF INFECTION IN THE NOSE AND THROAT.

BY H. B. GRAHAM, M. D.

The Ear, Nose and Throat Department has examined twenty-three of Dr. Ely's arthritis cases, and of these only nine accepted operation. Of these nine two were acute or rather subacute cases and yielded to treatment by tonsillectomy readily. The other seven were various types of chronic cases, from ambulatory to bed ridden, and in all there was improvement which could be assigned to the tonsillectomy.

I think I am safe in saying that the more advanced the pathological change in the joint, the less was the improvement. This does not mean that long standing cases do not improve on removal of the focus, but that pathologic changes, such as new formed bony growths, are certainly not removed by operative procedures in the throat.

One case that was brought in on a stretcher with but little motion in the spine or either hip joint was able to walk out a month after tonsillectomy, with a flexible spine. The acute cases invariably respond on removal of the focus, but the mistake is too often made of not hunting far enough for that focus.

TRAUMA IN CHRONIC ARTHRITIS.

BY H. L. LANGNECKER, M. D.

In the consideration of these cases of chronic arthritis, attention must frequently be given to the group, in which trauma plays an important part. In the broad range of cases over which this general term is applicable, probably the chronic strained or the repeatedly traumatized joints, are most likely to show arthritic changes. It is to be noted that most frequently this chronic joint condition is found in middle aged and advanced aged persons; most frequently the lesions exist in some part of the spinal column, usually that part which receives the greatest strain; most frequently defective posture is present and the postural condition is made worse in the course of the arthritis. This is naturally so on account of the excessive strain placed on the spine as part of the body structure. Chronic strain or trauma must play the role of changing the conditions about the joints so that the infectious or toxic elements more easily produce the irritation of the tissues which later cause the arthritic changes.

Eliminate the infection or toxin, correct the mechanics—and thereby relieve the strain—and thus the patient is benefited.

CASES WITH A FOCUS IN THE GENITO-URINARY TRACT.

BY F. T. WILLIAMS, M. D.

Forty cases of arthritis with definite foci of infection in the genito-urinary organs have been treated at Stanford during the last year. Of these, eleven were diagnosed chronic prostatitis, chronic urethritis, and chronic seminal vesiculitis; eight, chronic prostatitis and chronic urethritis; two, chronic prostatitis, and seminal vesiculitis; twelve, urethritis, eight chronic, two subacute, two acute; six, chronic prostatitis. One case diagnosed as gonorrheal rheumatism was not examined in the Men's clinic, although he gave a history of previous attacks of gonorrhea. One case out of forty definitely denied gonorrheal infection. The remaining either gave positive histories, or the matter was not noted. Diagnosis in all these cases was arrived at through careful consideration of the history, observations on the urine, the presence of enlargement and induration of prostate and seminal vesicles, and the presence of pus cells in the prostatic and vesicular secretion, with the aid of vasotomy and x-ray studies in some cases.

I wish to report two cases illustrating methods used in treatment. The first patient, Andrew O., aged 43, occupation gardener. Complaint—pain in both feet, duration four months. Diagnosis by Orthopedic Department—Chronic arthritis. Denies venereal infection. History otherwise negative. When first seen, January 25, 1916, patient was incapacitated for work. Examination made at that time revealed chronic prostatitis, chronic urethritis. No other focus of infection was found. Treatment directed towards the elimination of this focus brought about a marked improvement within a few weeks. On February 16, 1916, it was noted, arthritis much improved. Since then the patient has followed his occupation without any inconvenience. Prostatic massage, irrigations, dilatations, and instillations have apparently entirely relieved this patient of his arthritic condition.

Second Case.—Calvin C., aged 28. Occupation, barber. He gave a history of two attacks of gonorrheal urethritis, the last one occurring in December, 1914. Seven months later he noticed a dull aching pain in both ankles and heels. When seen at Stanford in January, 1916, one year after his last gonorrheal infection, he was able to bear scarcely any weight on the feet, his joints being extremely painful. Examination at that time showed urine voided in two glasses, quite cloudy, and containing shreds. Right testicle small and atrophic. Right epididymis normal. Left testicle normal. Left epididymis enlarged and indurated, as a result of previous acute epididymitis. Rectal examination showed induration in prostate and left seminal vesicle. He entered the hospital February 3, 1916. Soon after admission he had an acute exacerbation of epididymitis and seminal vesiculitis, the temperature rising rapidly to 105° F.,

but falling to normal within 5 days. I operated upon this patient February 8, 1916. Operation consisted in exposure of vesicles through the perineal route, using technic of Young, with the excision of the posterior wall of the left vesicle and the breaking up of adhesions. Convalescence uneventful. Patient returned to work, —soon after leaving hospital. In a letter dated December 5, 1916, patient states that his sexual powers are good and that his arthritis has been entirely relieved.

When we consider the structure of the seminal vesicles it seems quite natural that we should expect to find foci of infection quite often in these glands. Picker of Budapest made a series of dissections of seminal vesicles. From 72 specimens examined, 56 were normal, and 16 pathological. He derived the following classification:

1. Simple straight tubes, 4 percent.
2. Thick twisted tubes, with or without diverticuli, 15 percent.
3. Thin twisted tubes, with or without diverticuli, 15 percent.
4. Main tubes straight or twisted with large globe-like arranged diverticuli, 33 percent.
5. Short main tube with large irregular ramified branches, 33 percent.

Proximity to the posterior urethra renders these organs especially liable to infection in cases of posterior urethritis. Once infected, their structure as indicated above, renders free drainage difficult.

Fuller and Lloyd were pioneers in the operative work on seminal vesicles. The exceptional skill of Fuller enabled him to accomplish some remarkable results through operative measures. The blind technic of Fuller has been largely succeeded by the careful dissections and exposure as accomplished through the methods of Young and Squier. The technic of the latter two consists in practically the same exposure used in perineal prostatectomy, the most important exception being that the urethra is not opened in seminal vesiculotomy. In this way the vesicles may be brought into view, and either removed or drained by multiple incision directly under the guidance of the eye.

FOCAL INFECTION IN THE JAWS.

By FREDERICK WOLFSOHN, D. D. S.

Thirty cases complicated by infection in or about the teeth have been referred to me² by the Orthopedic Clinic. Pyorrhea alveolaris in all degrees from simple gingivitis to conditions in which pus flowed from the gum margin upon pressure was almost invariably found. In 77 percent of the cases the x-ray demonstrated apical abscesses about one or more teeth.

²In this list I do not include cases referred to my predecessor at the clinic.

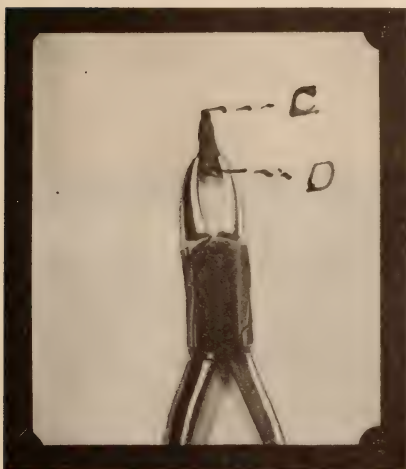


Fig. 1.—Showing extracted tooth with granuloma (C).

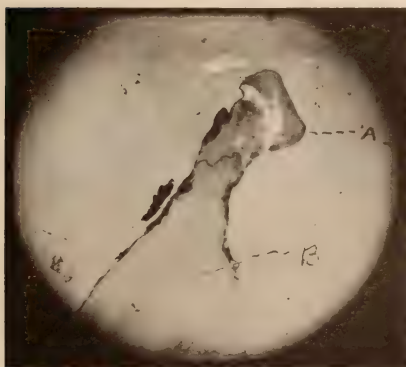


Fig. 2.—Low-power microphotograph of Fig. 1. A, granuloma; B, apex of tooth.

The radiographic evidence of an apical abscess (see Fig. 1, 2, 3) is easily demonstrated by a more or less circular shadow about the apex of the tooth which represents a granuloma. This is practically always in bone which has been absorbed during the process of development of the abscess. It is characteristic of these granulomata to have tough resistant sacks which can be easily removed en masse by curettement. Cultures from them invariably show the presence of streptococcus viridans.

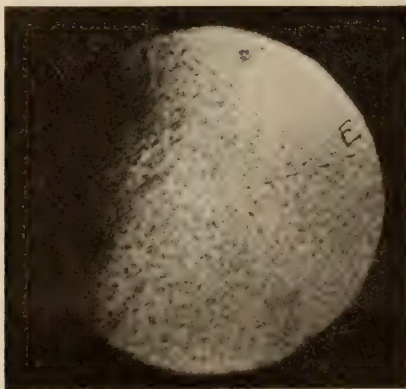


Fig. 3.—High-power microphotograph of granuloma. E, granulation tissue.

The most potent causes of apical abscesses are: first, infected pulps; and secondly, faulty root canal technic.

The treatment of these cases is divided into three groups; first, medicinal; secondly, surgical; and lastly, radical. The medicinal consists of applying disinfectants to the root canals, such as formo cresol. The surgical treatment of root scaling or apicoectomy with curettement and the radical treatment of extraction and bone curettement.

SOME NEW FINDINGS IN EPILEPSY.

By EDWARD A. TRACY, M. D., Boston.

A somewhat intensive study of a case of epilepsy during the past year resulted in the findings briefly described below. The findings are based on notes of over five hundred examinations in which the reflex-vasoconstriction reaction-times and the reflex vasoconstriction valuations are carefully recorded.

The case studied is one of chronic epilepsy, the patient, a girl now fifteen years old, having a history of severe convulsions for a period of two weeks in infancy. At five years of age an attack of measles occurred. At seven years, patient commenced to have attacks of *petit mal* which changed to attacks of *grand mal* at eight years, and since then the disease has increased in severity, the patient averaging sixteen attacks of convulsions a month during the past four years. She is undersized, underweight, and has good mentality.

The findings noted are:

1. Chronic vasoconstriction spots.
2. Abnormal reflex-vasoconstriction phenomena.
3. Increased tonicity of sympathetic fibers, preceding convulsive seizures.

4. Abnormal face reflexes.

5. Hypercontent of adrenin in the blood-stream.

6. Lowered content of lime in the bones.

1. *Chronic vasoconstriction spots*.—On the left forearm of the patient, on the dorsal surface, a triangular whitish spot was noted (it could be covered by a split pea), and several smaller and irregularly shaped whitish areas on the dorsal surface of the right forearm. At times these spots were seen to be lessened in whiteness—almost of the same tint as the surrounding skin—and at other times to become more markedly white while under observation. There could be no question, therefore, that they were in reality due to vasoconstriction. Observations of these spots covering a period of ten months showed them to occupy the same position on the skin, i. e., they are chronically located vasoconstriction spots. Since discovering chronic vasoconstriction spots in this case, the writer has observed them associated with other neurologic conditions. Their causation and signification are the subject matter of a special article in course of preparation.

2. *Abnormal reflex-vasoconstriction phenomena*.—Reflex-vasoconstriction (anemic dermography) has been found to be the second

component of the normal reaction of the skin to stroking, the first component being a brief lasting vasodilation.¹ As the presence of anemic dermatography demonstrates the presence of adrenin in the blood stream,² its importance to the clinician is obvious. The reaction-time, which is the time it takes the vasoconstriction to appear after stroking the skin (best taken with the aid of a stop watch), may be taken as a measure of the tonicity of the sympathetic nerve cells. In infants, the writer has found the reaction-time for anemic dermatography to be as low as six seconds. In this case of epilepsy the reaction-time for reflex vasoconstriction on the face varied at different times, the readings being from six seconds to thirty-one seconds, and, for the arms, the readings were from eight seconds to thirty-one seconds. Also, the reaction-time for reflex-vasoconstriction is not the same, as a rule, on the right and on the left sides of the body, and this difference is variable—veering from a less reaction-time on the left side to a less reaction-time on the right side. These differences of reaction-time are abnormal—so determined by reaction-time tests made on a large number of normal individuals.

3. *Increased tonicity of sympathetic fibers preceding seizures.*—Almost invariably a short reaction-time for some part of the sympathetic nervous system tested was present, preceding an attack of convulsions. If the reaction-time be taken as an index of the tonicity of the sympathetic nerves tested, this finding signifies a relative increase of nerve tonus in the sympathetic fibers giving the short reaction time.

4. *Abnormal face reflexes.*—In this patient, the reflex vasoconstriction of the face differs from the normal. In place of a well defined streak of anemic dermatography following the stroking of the skin, on the right cheek a widened and irregular shaped area of vasoconstriction appears and on the left cheek a patchy streak is the result of stroking.

Echeverria³ described a lesion of the sympathetic nerves, including the cervical sympathetics, which he found present in a series of autopsies made upon epileptics. He described it thus: "The lesion is constituted mainly by a proliferation of connective elements and their subsequent substitution to the nerve cells and fibers, finally undergoing retrograde degeneration." Echeverria's pathological findings will account for the escape and diffusion of nerve stimuli, and the absence of stimuli in the patchy streak reflex, both evidently present in the abnormal face reflexes reported above. I look upon the abnormal face reflexes present in this case as a clinical manifestation of Echeverria's lesion of the cervical sympathetics.

5. *A hypercontent of adrenin in the blood stream.*—Experiments made by myself (to be published later) show that adrenin added to

the blood stream increases the valuation (that is the intensity of color and the time it lasts) of anemic dermatography. For this and others reasons, a high valuation in anemic dermatography is taken to mean a hypercontent of adrenin in the blood stream.

A high valuation of anemic dermatography was often observed in this case of epilepsy, between the attacks. After an attack of convulsions a sudden fall in the valuation was generally observed.

6. *A lowered content of lime in the bones, showing a disturbance of calcium metabolism.*—The writer x-rayed this patient's right hand and wrist together with that of a normal child of the same age. The x-ray plate shows a lessening of density in the bones of the epileptic, demonstrating a lessening of the calcium content in her bones. The carpal end of the ulnar was bigger, the remaining bones smaller in the epileptic.

REMARKS ON THE FINDINGS AND SUGGESTIONS FOR FURTHER RESEARCH WORK IN EPILEPSY.

As the case of epilepsy in which these findings were made is an ordinary case of idiopathic epilepsy, I was not surprised to find the majority of them confirmed in a brief examination of some eighty other cases. The fuller significance of these findings will be treated of in a later communication. A study of the reflex-vasoconstriction valuation points to a hyperactivity of the suprarenals or more accurately of the chromaffin tissue. The possibility of the vitiation of metabolism present in this disease being caused by a hypercontent of adrenin in the blood stream should not be lost sight of.

The writer has found the presence of adrenin in the blood stream to be a *sine qua non* for reflex vasoconstriction. If reflex vasoconstriction of the cortical blood vessels be the immediate cause of the loss of consciousness in epilepsy, and the immediate precedent condition of the convulsive seizure—we can perceive one of the relations of a high adrenin content in the blood to this disease. The higher the adrenin content the longer will last this vasoconstriction and the more severe the trauma done the brain tissues by deprivation of their normal blood supply. The constant recurrence of such a condition would be an adequate cause for the cortical gliosis found in chronic idiopathic epilepsy.

In conclusion I believe the time ripe for a concerted scientific study of epilepsy from the clinical, metabolic, pathologic and therapeutic standpoints. Its real nature—it appears to be an endocrine glandular disease—could be thus established. Studies of its metabolism, similar to those which have been so productive of results in diabetes and hyperthyroidism are urgently needed. The condition of the endocrine glands should be carefully noted in systematized autopsies. The chemistry of adrenin, its reactions with other substances should be investigated with the object in view of finding

a safe neutralizer of it in the body. Therapeutic investigation with the aim of putting a brake on the hyperactivity of the adrenin making chromaffin tissue is desirable. Reflex vasoconstriction valuation can be used to test the efficacy of therapeutic measures undertaken to control the activity of the suprarenals. Such an investigation would certainly bring us nearer the goal we all are striving for—the mastery of this ancient and mysterious disease.

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THE GENERAL ETIOLOGY OF CUTANEOUS DISEASES.

BY WALTER JAMES HEIMANN, M. D., New York City.

To whom the door of the most holy sanctuary is shut dermatology must seem a language rather than a science. Anyone, however, earnestly seeking passage beyond the barricade of verbiage will find much to reward his effort. Dermatology has ended its era of dissociation and is finding its proper place in the scheme of things medical. It is because of human love of speculation that the organ visible to any who wish to regard it, is the one which fewest physicians have attempted to understand. It is far more fascinating, perhaps, to theorize about morbid processes within the body than to study and try to understand what is clearly in view. In internal medicine autopsies are necessary that the hidden may be revealed. There have been no great internists who have not been good gross pathologists. Yet, though clinical dermatology is nothing else than gross skin pathology, very few have accorded it its merited attention.

There are numerous reasons for this. Fine objective distinctions have been noted among dermatoses and have become the basis for creating numerous disease entities which may not, after all, prove to be real entities. They may actually be closely bound by every essential bond except that of appearance. This tendency to differentiate and analyze has produced a crop of designations, the actual roots of which are rather in the eyes of the observer than in fact. In other words, dermatology has hitherto been subjected to analytical rather than to constructive thought.

Where in pulmonary diseases we group all forms of tuberculosis under one head, taking obvious variations for granted, in cutaneous medicine we recognize four tubercular maladies due to active bacilli themselves, and at least twelve so-called tuberculides due, perhaps, to tubercular toxins or attenuated or dead bacilli. Undoubtedly this sort of thing develops in the dermatologist acuteness of vision, resourcefulness in dialectics and expertness in debate. There is a certain value of its own in this, but the tendency is diffuse rather than precise, and diverges from the synthetic philosophy that modern medical progress demands. Thus dermatology has seemed needlessly complex and perhaps even petty to those who have not looked beneath the cutis into the depths. For this reason it has become, however unjustly, an object of derision to men engaged in other fields of medicine.

As with tuberculosis, so with many more affections of the skin.

Eczema in every respect corresponds to the simple type of dermatitis caused by such external agents as corrosive sublimate, poison ivy, and primrose, or associated with internal processes such as diabetes. Yet eczema has been artificially separated from simple dermatitis. On the other hand urticaria, whether due to external or internal agents, is dismissed when it has received its clinical label and complacently relegated to the scrap heap of uninteresting dermatoses because it is common. *Purpura annularis telangiectoides* is rare and hence an interesting field for speculation; *syngocystoma* is fascinating because of its relation to birthmarks. But when the mystery surrounding these conditions has once been removed, will the human race be much better off? Similar energy directed toward explaining dermatitis, psoriasis, lichen planus or urticaria would be of much more practical value and would relieve much more suffering.

The reflex neuroses, vaguely incriminated heredity, and entirely innocent climatic conditions have been held accountable for many dermatoses. The time for this sort of thinking is over, just as the time has vanished in which the source of malaria was considered miasmatic, and the bubonic plague due to divine visitation. Today we are seeking the cause of illness where it is to be found, namely, in the response of the body to a poison. This holds except in diseases due to anomalies or injuries, and the very restricted group that are truly hereditary. Whether the poison be ingested or the product of disturbed metabolism, introduced from without, or engendered within by habits, occupation or environment; or whether it comes from infecting agents, disease is the result of tissue reaction to toxins. This is the great underlying principle to be accepted, if we are understandingly to approach the problems of medicine.

The mechanism of disease production depends upon three factors; predisposing, exciting and precipitating. The predisposing factor represents the fertility of the body with reference to the second or exciting factor. The exciting factor is the toxin or poison, whatever its source. The precipitating factor is the local condition which determines the site or sites at which the lesion or lesions of disease develop. For example, in dermatitis there is some underlying cause, an exciting cause and a local cause. Among the underlying or predisposing conditions may be protein putrefaction, constipation, or sensitization to alien proteins; among the exciting causes chemical, physical or infectious agents; among the precipitating causes, seborrhea, ichthyosis, excessive perspiration, abnormal dryness, anatomical or physiological characteristics varying in different regions of the body.

This brings us to the question of the localization of skin lesions. It is well-known that seborrhea and acne favor the face, scalp,

sternal and interscapular regions; that is, places in which the activity of the sebaceous glands is most marked. Rosacea is restricted to the face; erythema multiforme prefers the wrists, forearms and neck; lichen planus the fronts of the wrists, glans penis and buccal orifice. Urticaria appears anywhere. Almost all skin diseases have some favored site. This indicates that the skin at certain areas possesses some peculiarity of structure or function which renders it vulnerable in a given disease to the action of the latter's particular causative agent. This agent in turn is pathogenic because of a general predisposition. If this were not true everyone would have every skin disease on earth, and every skin disease would occur all over the body instead of prevailingly at definite situations, always more or less characteristic in each dermatosis.

Of perhaps greater significance than localization is an important law in dermatology known as the doctrine of cutaneous reactions, originally postulated by Besnier. A tissue is capable of expressing pathological alterations in a comparatively limited manner. Numerous causes may excite similar pictures. One cause may produce varied pictures. These principles can be best explained by examples, and the best examples of identical tissue reactions to innumerable agents are urticaria and dermatitis. The opposite condition is felicitously illustrated by the many dermatoses provoked by a drug. Bromides may give rise to erythematous, papular, varicelliform, ulcerative and granulomatous dermatoses; arsenic to erythema, herpes, excessive pigmentation and warty excrescences. The application of the principles here involved is necessary to an intelligent view of dermatology. Failure to realize these principles has been the reason for assuming the existence of numerous diseases which are in no sense diseases at all, but symptoms. The history of cutaneous medicine thus fairly staggers with confusion of causes and effects, and it will take time and calm reflection to arrange matters with reference to fact.

The interpretation of the preceding phenoma is on the whole not difficult. To prove the interpretation will require patience. Erythema and the wheal are among the simplest of cutaneous reactions, immediately depending as they do upon vasomotor disturbances. Thus, these lesions may be regarded as generic in type, and there are few dermatoses which do not commence with erythema. For this reason the erythemas and urticaria have more causes than any other dermatoses. It is simply because there are more toxins capable of producing slight than profound changes in the skin, whatever the source of the toxins. On the other hand, such a series of phenomena as has been mentioned with regard to arsenic is to be otherwise explained. Arsenical erythema, whether scarlatinoid or morbilliform in character, is a generic reaction in the vessels. Arsenical herpes indicates a special affinity of the nerves for the of-

fending drug, and this is evidenced by a trophoneurosis which takes the clinical form of vesiculation. Hyperpigmentation denotes a predisposed chromaffin system, and hyperkeratosis a peculiar susceptibility on the part of the mechanism controlling the formation of normal cuticle.

When one reflects that a single substance, such as arsenic, can stimulate the skin to a variety of morbid responses widely separated in character and in the nature of the underlying mechanism; when one further reflects that entirely unrelated factors and mechanisms can produce one single clinical picture such as urticaria, one grasps the complexities to be encountered in an endeavor to ascertain the etiology of skin diseases. Why do very few diabetics have skin affections? Why are these affections so varied in form (dermatitis, furunculosis, gangrene or pruritus)? Why is it that of thousands taking quinine or arsenic only a few present cutaneous manifestations? Why do so relatively few persons exposed get ringworm, or pityriasis versicolor, and still fewer favus? It is because diabetics cannot get skin diseases unless the skin is abnormal to the extent of being so susceptible to the general etiological factor as to respond to the latter. It is because a human being will not be infected by a trichophyton unless his general condition is such that he is receptive. It is because no body tissue is autonomous and there are properly speaking no pure skin diseases excepting the few mentioned in the introduction. However simple skin diseases may appear to be, all of them depend upon interoperating internal and external conditions. Until a general effort is made to revise our ideas with these principles in mind, dermatology will remain a gaudy but disconnected ring about the Saturn of scientific medicine.

Medicine not purely clinical is scarcely a century old. Three generations ago definite tendencies began to assert themselves to attempt to explain disease rationally by studying rather than surmising its causation. This tendency has begun to bear fruit within the last generation, but it is scarcely over a decade since dermatology has felt the influence of such scrutiny. Thus, little actual knowledge exists of the causation of skin diseases. Nevertheless, a few facts begin to stand out. About these, without question, others will gradually group themselves, until finally they assume some definite shape. The facts under consideration are referable to deranged carbohydrate, nitrogen and lipid metabolism; digestive, endocrinous gland and hemopoietic disturbances, and the response of the skin to so-called anaphylotoxins, infectious, chemical and physical agents. Heredity, which plays a trifling role, and congenital anomalies and injuries will not be considered in this paper.

Diabetes is often associated with furunculosis, carbuncle, hemo-

chromatosis, dermatitis, xanthoma, gangrene, excessive sweats, and perforating ulcerations. These conditions may be loosely grouped: furunculosis and carbuncle indicating increased susceptibility to pus organisms; dermatitis, increased instability of the cutaneous vessels; gangrene, a profounder response of the vessels; hyperhidrosis, a neuropathic disturbance; perforating ulcer, a still profounder one; xanthoma, a lipoid disturbance; and hemachromatosis, an enigmatical condition involving destruction of erythrocytes. It would be idle to pretend that a single one of this list is purely a skin disease. Furunculosis and carbuncle are the simplest. They depend upon the predisposing cause (diabetes), the exciting cause (pus germs), and the precipitating cause (something local rendering the skin vulnerable). Undoubtedly a similar mechanism, were the task not too complex, could be traced out in each of the other diseases mentioned. In these, however, the central and sympathetic nervous systems, possibly the adrenal, pituitary and thyroid glands, disturbed cholesterin metabolism, and so forth, play important roles causing respectively the perforating ulceration, sweats, hyperpigmentation and xanthomata.

Lesser disturbances in sugar metabolism than diabetes are also associated with cutaneous illnesses. In some investigations which I had the pleasure of conducting with Dr. Hans Schwartz, we noted that the blood sugar was raised (alimentary hyperglycemia having been excluded) in well over sixty percent of cases of seborrhea, rosacea, sycosis, acne vulgaris and furunculosis. Without attaching undue importance to these facts, it seems very significant at least that three of the enumerated conditions should depend upon the activity of pyogenic cocci in people with an excess of sugar in their blood. Further aspects of this will be discussed in connection with digestive disturbances.

Disarranged nitrogen chemistry has been an alleged cause in numerous dermatoses, notably eczema, dermatitis herpetiformis, prurigo and psoriasis. Undoubtedly, nitrogen retention, as determined by analyses of the urine and blood, often exists in these diseases, both with and without permanent renal disturbances. The proportion of instances in which this occurs, though numerically large, is relatively small. This is due to the fact that many cases which may clinically be diagnosticated as above are etiologically unrelated. The doctrine of cutaneous reactions should here be recalled; namely, that a given clinical picture may result from numerous causes, one of which, in the above conditions, is nitrogen retention. Another principle is also nicely illustrated, namely that one cause (nitrogen retention in this instance), may provoke various skin reactions, psoriasis, dermatitis herpetiformis, et cetera.

Of course, this enormously complicates discovering the fault in any one instance, for even a demonstrated nitrogen retention may

not necessarily be the underlying factor in the disease, but may, in common with the skin condition, be an expression of some still remoter disturbance. In spite of this, in many diseases the nitrogen balance should be studied, for correction of its disturbance often cures the skin disease. Schamberg's famous studies indicated that in psoriasis "the retention of even large quantities of nitrogen may not be accompanied by any gain in weight." This is astonishing and inexplicable, and would be hard to believe, were it not for the acknowledged excellence of Raiziss, who did the chemical analyses in the work in question. Beyond a doubt there is some profound alteration in nitrogen metabolism in psoriatics, as Bulkeley indicated years ago by empirically restricting proteids in this disease with alleged benefit in almost every instance.

In prurigo and dermatitis herpetiformis, Johnston and Schwartz reported many instances of improvement, if not cure, on restricted proteid diet, particularly when there was nitrogen retention. An increase of nitrogenous diet often provoked relapses.

A certain relationship exists between xanthoma tuberosum and abnormal lipid chemistry. In a series of notable experiments by Lebedew, xanthoma was produced in rabbits by feeding them cholesterol. Under ordinary conditions no lesions were produced, but if the skin was injured lesions developed at the sites of trauma. Incidentally this is a nice example of the interoperation of local and general causes in determining the development of skin changes. It is likely that xanthoma is incapable of developing without cholesterinemia. On the other hand, a large proportion of pregnant women have an excess of cholesterol in the blood, but xanthoma is not restricted to this class of people, nor is it even much more common among women than men. This disease is the only one in which until now any even remote relation to lipid metabolism has been demonstrated. Undoubtedly though, fat indigestion is related to some types of eczema, particularly in infants. Certain cases in adults may have a similar origin which in turn may be referable to pancreatic or hepatic insufficiency.

The relation of digestive disturbances or diseases to cutaneous maladies is a matter about which it is difficult to be arbitrary. It is impossible always to tell whether the skin manifestations are directly referable to the gastro-intestinal tract, or whether both the external and internal ailments have a common remoter origin. There is no question that chronic gastritis, gastric ulcer, hyperacidity, starch indigestion, and carbohydrate fermentation are found in a large proportion of patients who have acne, rosacea, seborrhea, sycosis and furunculosis. It will be noted that this is the same group of cases in which hyperglycemia so often is present. That congestion of the gastric vessels causes immediate dilatation of the skin capillaries is amply attested to in people with rosacea, for when

these patients eat condiments, spices, or food at too high a temperature, their faces glow and they complain of feeling flushed. The face and scalp of many individuals itch after the ingestion of highly seasoned food, and rosacea and even ordinary acne are curable only when the proper diet and internal treatment are outlined. Constipation and proteid putrefaction are associated with many cases of dermatitis of unknown origin (eczema), urticaria, dermatitis herpetiformis and prurigo; or that group in which defective nitrogen metabolism has often been demonstrated. The same is true in many cases of psoriasis, but this disease is often associated with carbohydrate fermentation as well. It must not be forgotten, however, that in many instances all of the conditions enumerated may exist without any demonstrable functional or organic disease of the alimentary tract.

The connection between cutaneous and endocrinous gland disturbances is still vague. In acromegaly there is thickening of the skin; in hypopituitarism there is hirsutes; the dryness of the integument and malar flush associated with Graves disease are well known. In cretinism the curious hardness of the integument, the brittle, lustreless hair and nails are matters of common knowledge. It is not yet, however, generally recognized that scleroderma, both diffuse and localized, often respond to the administration of pituitary or thyroid extract, a fact which throws a great deal of light on the causation of these diseases. At least, some forms of hyperpigmentation, notably in Addison's disease, are due to adrenal body affections, nor can it be doubted that acanthosis nigricans and uterine chloasma, so long accredited to sympathetic nerve disturbances, are actually due to an alteration in the endocrinous system. Vague as all of this still is, it is all at least significant. It is also probable that several of the conditions associated with hyperglycemia are in the last analysis due to alterations in the internal secretory organs controlling sugar metabolism, and this appears particularly to be the case in acne vulgaris. This disease, as all know, starts at puberty, or at the time when the genitalia begin their active functional life, when the pubic and axillary hair develops, when the female breasts enlarge, and sex differentiation is established. That these phenomena depend upon the glands of internal secretion is so likely as to be almost undebatable. With these features of adolescence is associated increased activity in the pilosebaceous system. Knowing the complex interrelationship between these skin changes and the development of the genitalia it seems reasonable to refer both back to a single cause, and knowing of the relationship of the pituitary body, thyroid gland, pancreas, liver, and adrenal bodies to sugar metabolism, one can easily appreciate why acne, which appears during this revolutionary period in the human economy, is associated with hyperglycemia. To refer once more to scleroderma,

this condition is frequently accompanied by an enormously increased sugar tolerance, added evidence that it depends upon hypopituitarism or hypothyroidism.

Another vague but significant group of cutaneous maladies are those depending upon the hemopoietic system. These are mycosis, leucemia cutis and possibly sarcoma. All of them have been found associated with leucemia or aleucemic leucemia. Many of these conditions are grouped as leucemides, and the gradations from sarcoma to mycosis, and finally to the true leucemides are so fine and subtle, and the relationship of some with adenosis, myelosis and splenic enlargement is so constant that no one can doubt the etiological connection of the skin conditions with that of the leucocyte producing system.

Sensitization to proteids is probably an important factor in the etiology of dermatoses. Unquestionably many cases of dermatitis (eczema), prurigo, and practically all of the urticarias are thus caused. The mechanism is not entirely clear for few experiments exist as clean cut as those of Oscar Schloss' in connection with egg albumin urticaria. The efforts of Charles White, McBride and Schorer have sought to clarify the situation, but on the whole very little that is sound has been accomplished by percutaneous tests with various proteid extracts. On the other hand, it is a fact that certain individuals are intolerant to certain common articles of diet, notably, bivalves, crustacea, strawberries, fish and pork. Such people get urticaria after partaking of the pathogenic food. Pirquet and Schick's serum sickness is an example of this type of skin response.

The reaction of the skin to external and internal infections, chiefly focal infections, as shown by Ravitch, is a subject replete with significance, and analogous to the cutaneous response to physical and chemical agents externally active, and chemical agents and drugs working from within. A protracted discussion of these considerations, however, would more than double the length of this paper. Suffice it to say that the principles involved are identical with those of the groups of diseases already enumerated. The eruptions produced vary from toxic erythemas to granulomas and hyperpigmentations, running the entire gamut of cutaneous lesions.

SUMMARY.

Whatever the internal cause may be, it will never produce a skin disease unless the skin is peculiarly vulnerable, or predisposed. Whatever the external cause may be no skin disease will be produced unless the human being is peculiarly vulnerable, or predisposed. These two considerations are mutually supplementary, and depend upon a nice and subtle interdependence of all organs and systems including the skin. The skin may no longer be considered

an outcast to be ignored by the internist, nor any longer accepted as an outcast by the dermatologist, who thereby tends to regard skin diseases as separated from all other abnormal processes within the body.

The preceding is not exactly the text of a sermon, but it may be permissible to indicate that the internist would do well to abandon the idea that there is no more to dermatology than a prescription for Lassar's paste, just as the dermatologist has been at last aroused to the fact that a sclerodermatous patch may rather be a disease of the hypophysis than of the skin. Skin manifestations are so numerous that it is the work of a lifetime to master them and their significance. It is accomplishing the latter, however, that is the really essential part of dermatology, and it is to be hoped that we may hew to this line, letting the Latin and Greek names fall where they may.

108 West 87th St.

KRUKENBERG CANCER OF THE OVARY.

By PHILIP J. REEL, M. D., Columbus, Ohio.

No organ in the human body presents a more difficult problem in the histogenesis of its tumors than does the ovary. According to Wolff, ovarian neoplasms are best classified as:

1. Cystic tumors which take their origin from the follicles or from the glandular elements.
2. Dermoid cysts.
3. Solid tumors which arise either in the connective tissue or epithelial elements.

This last group comprises fibromas, sarcomas and carcinomas. Solid tumors of the ovary, while not rare, are not the type most frequently encountered. Fibromas are usually stated as comprising two percent of ovarian tumors. There is some evidence, however, that they are more frequent in practice than in the literature. According to the more recent statistics, sarcomas are given as making up something over five percent of all ovarian tumors. The carcinomatous type of ovarian tumors is rare.

The occurrence of solid cancer of the ovary is sufficiently rare to warrant a careful study of each case encountered. These specimens become all the more interesting when they take on the histological characteristics described by Krukenberg. While European literature abounds with references to this type of ovarian tumor, the subject has received but little attention from American pathologists and gynecologists.

In 1896 Krukenberg described a bilateral new growth of the ovary. These tumors usually preserved the shape of the organ, were of firm consistency with occasional softened myxomatous areas. Histologically, they presented areas in which the ovarian stroma had taken on excessive spindle cell production sufficient in Krukenberg's opinion to justify a diagnosis of fibro-sarcoma. Other areas assumed a myxomatous appearance. Large epithelial cells appeared in groups scattered here and there, some of which were arranged in definite tubules. These cells were described as being distended with mucoid material, which, after pushing the nucleus to one side, caused them to present a signet ring appearance.

Stone, in 1916, emphasized the importance of the problems concerning the various routes of cancer metastasis. More particularly was this brought out in relation to the possible channels by which secondary growths make their appearance in the ovary. He concluded that chance distribution into the ovaries by way of the blood

or lymph system is but rarely encountered, but that metastasis either occurs by a direct extension through the retroperitoneal lymph nodes by permeation or retrograde transportation, or by peritoneal implantation.

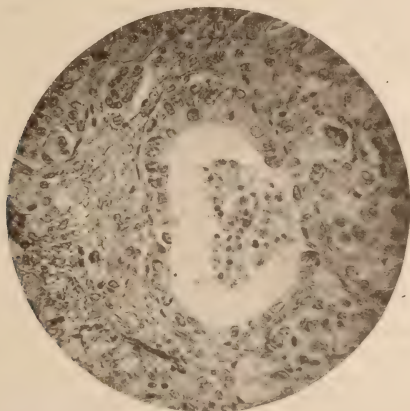


Fig. 1.—From an area showing a distinctly carcinomatous type of growth.

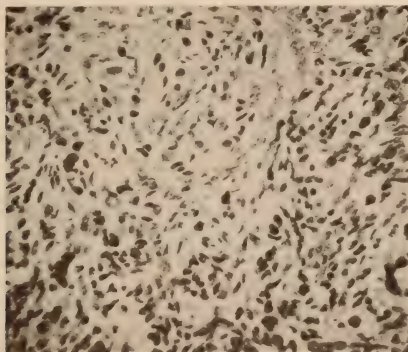


Fig. 2.—From an area in which the tumor cells assume a form which can be distinguished from the stroma with difficulty.

In regard to the Krukenberg tumor, he says, "It may be a primary growth, but in the vast majority of cases it presents the histology of a secondary, diffuse, infiltrating carcinoma, which derives its features from those of a primary growth in the stomach, or from

degenerative changes which are so common to all forms of ovarian growth—myxomatous degeneration, mucoid degeneration of the cells—and, frequently, from a reaction of the stroma to the invasion of cancer-cells in the form of a cellular hyperplasia.”

There is in the Museum of Pathology at the Ohio State University, a specimen of Krukenberg's tumor of the ovaries. The patient Mrs. W. H. C., age 33, came to operation because of disturbed menses and enlargement of both ovaries accompanied by retroversion of the uterus. Operation disclosed a bilateral new growth of the ovaries accompanied by retroperitoneal lymphatic involvement. Not only were the nodes enlarged, but there was a distinct palpability of the lymph vessels. Careful examination of the upper abdomen failed to reveal any other visceral involvement. A double salpingo-oophorectomy was performed.

The gross specimen of the ovaries measured 5x4x3.5 cm. (right) and 4x3x2.5 cm. (left). The normal shape and contour was retained in both instances. Neither organ presented any evidence of adhesions. Upon section the cut surface was whitish in appearance, and solid except for an occasional micro-cyst.

Microscopic examination revealed no normal ovarian tissue except for one or two Graafian follicles in the many sections studied. The stroma in its arrangement and appearance corresponds very closely to that described by Krukenberg. The connective tissue cells in the more dense areas, although spindle shaped are closely packed together. Distributed throughout this connective tissue are cells which in their morphology and arrangement have the distinctive appearance of epithelium. In the less compact areas the stroma takes on a myxomatous appearance. Where the connective tissue presents a more loose arrangement the epithelial cells appear to contain more mucus. Many of these epithelial cells present a signet ring shape. Throughout the tumor these cells also show a decided tendency to arrange themselves in tubules.

The primary character of a malignancy occurring as a bilateral involvement in paired organs, such as the breasts, the kidneys and the ovaries, should always be viewed with suspicion. It is generally recognized that the symmetrical involvement in most cases indicates a primary growth situated elsewhere in the body, which may present no symptoms, and may be impossible of clinical diagnosis. Metastasis from the intestine is found rather frequently in the ovary. It is usually stated that 10 percent of gastric carcinoma in females produce secondary growths in the ovary. In the cases of carcinoma of the breast studied by Handley, metastases were present in the ovary in 4.8 percent of the Middlesex Hospital series and in 8.6 percent of the Guy's Hospital cases.

The failure to secure an autopsy later in this case leaves the exact origin of this tumor in doubt and only serves to emphasize the

need of more careful anatomical study in those cases presenting solid tumors of the ovary. Certain facts suggest the metastatic character of this tumor. It involved both ovaries. These organs were approximately of the same size. The almost complete destruction of the ovarian tissue makes it impossible to identify the point of origin, even though the tumor were primary in the ovary. The retro-peritoneal lymphatics were involved. This was not, however, of sufficient extent to warrant the supposition that a primary growth existed in the alimentary tract. Conversely, the epithelial cells in the tumor have taken a distinct tubular arrangement in many places, resembling very closely that seen in intestinal carcinomata. Even though no primary growth could be demonstrated elsewhere in the body, the weight of evidence would seem to point to the metastatic nature of this new growth.

SUMMARY.

This tumor is of the type described by Krukenberg, but it presents quite a strong evidence of being metastatic in origin. This bears out the more recent investigations which tend to prove that, in the vast majority of instances, solid carcinomata of the ovary are secondary to some primary growth in the breast or alimentary tract. Frequently the seat of the primary growth is small, symptomless, and very difficult to demonstrate, unless a most careful necropsy has been made.

The author would here express his appreciation to Doctor Yeatman Wardlow for the use of his material and to Doctor Jonathan Forman for his criticisms and for the illustrations.

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DIAGNOSTIC AND THERAPEUTIC NOTES.

THE CANCER PROBLEM.—Bainbridge (Practitioner, March, 1917, LXXXXVIII, No. 3, p. 220). During the past two years little or nothing has been done abroad in the matter of cancer research. In this country, on the other hand, the work along this line has been very active. Among the more important contributions may be mentioned that of Maud Slye, who showed that the occurrence of cancer in mice is definitely a hereditary character. Leo Loeb demonstrated the important part played by internal secretion in the production of cancer, while Rous' discovery that a filterable virus could invariably produce sarcoma in chickens has led to a number of similar studies, all showing that a chemical or living irritable factor may be the cause of neoplasms. Our present standpoint may be summarized as follows:

1. None of the investigators have revealed anything concerning the cause of cancer which need influence our treatment of the disease.
2. The various tests and reactions described from time to time have not proved useful for purposes of early diagnosis.
3. Continued investigation has emphasized the importance of cooperation between physician and layman with reference to earlier and more accurate diagnosis of beginning malignant disease.
4. Nothing has been developed which, in any sense, detracts from the role of surgery in the treatment of cancer.

HYPERTENSION IN NEPHRITIS IN CHILDREN.—Berkley and Lee (Am. Jour. Dis. Child., April, 1917, XIII, No. 4, p. 354). In the nephritis, both acute and chronic, of childhood, the blood pressure is elevated, occasionally to a marked degree. The systolic pressure averages about 20 mm. Hg., the diastolic about 10 mm. Hg., above the normal. Occasionally, however, the hypertension may reach an extreme grade. Thus one case reported, a boy of 10 years, with chronic nephritis, had a systolic pressure of 250 mm. Hg. and a diastolic pressure of 190 mm. Hg. Usually the degree of hypertension is much less, but it is ordinarily definitely demonstrable. Its degree bears no definite relationship to the extent of the urinary abnormality, nor to the presence or absence of edema. Albuminuric retinitis is rare.

SMALLPOX VACCINATION BY PUNCTURE.—Hill (Brit. Med. Jour., Feb. 10, 1917). The skin at the site to be vaccinated is cleaned with soap and water and then with alcohol and ether. A capillary tube of glycerinized vaccine is used and three or four droplets expressed upon the skin, each droplet being at least 2 inches from its neighbor. An ordinary needle is sterilized and six tiny punctures, drawing no blood, are made through each drop, each set of six occupying a space of not more than $\frac{1}{4}$ inch square. The needle is always held parallel with the surface, so that not even 1/1000 of an inch enters the epithelial layer. A peculiar little snick is felt as the needle point goes in. The remaining vaccine is then wiped off and the sleeve is pulled down. No after-treatment whatever is required; none should be used; the only direction to the patient is *leave it alone*. In those not previously successfully vaccinated (and who have not had smallpox) nothing is found for several days; then there develops a typical vaccinal lesion, consisting of one, two, three, or four firm

pustules corresponding with the areas punctured. If left alone, without bandage or shield, etc., these remain firm and whole; then dry down into hard "buttons," which finally detach themselves, leaving a clean healed base, constituting a typical vaccine scar. If bandages, shields, etc., are used, the moisture from the perspiration, etc., thus retained, macerates the otherwise firm wall of the pustule, which then breaks, creating an ulcer open to infection. In those who have been previously vaccinated (or who have had smallpox) a raised red papule develops in a few hours; itches a little, sometimes develops a number of tiny vesicles over its surface, then dies down and disappears. This is the anaphylactic or accelerated reaction, indicating that immunity exists, sufficient to prevent typical vaccinal lesions. Occasionally a mild reaction of this kind, instead of disappearing, develops into a typical vaccinal lesion, the anaphylactic papules developing into ordinary vaccine pustules instead of receding and drying up. These pustules then run the ordinary course.

IS APPENDICITIS A TRANSMISSIBLE DISEASE?—Bloomfield (Med. Record, March 24, 1917, LXXXI, No. 12, p. 502). Mrs. G. was operated on for appendicitis. One week later her husband developed the same type of gangrenous appendicitis. These two individuals had been attending a relative who was operated on several months previously. Still another sister had recently been operated on for the same disease.

Bloomfield reports five other similar series of cases in which it is reasonable to conclude that the infection was transmitted from one member of the family to another, the cases in each series ranging from two to six. He believes they are not coincidences, but are due to infection with a type of microorganism that has a selective affinity for the appendix. A number of other observers, among them Rosenow, have described cases of appendicitis occurring in epidemic form.

TREATMENT OF PERNICIOUS ANEMIA WITH SALVARSAN.—Laempe (Med. Klin., Nov. 19, 1916). There is still much divergence of opinion regarding the value of salvarsan in pernicious anemia. The writer reports his own experience in three severe cases. In all of them the administration of small repeated doses of salvarsan was followed by restoration of the blood picture almost to normal. Two of the cases recurred later, one with a fatal outcome.

TONSILLECTOMY DURING ACUTE RHEUMATIC FEVER.—Morris (Jour. Lab. and Clin. Med., Dec., 1916). The frequency with which acute rheumatic fever is preceded by sore throat is variously estimated. Pribram finds it in only 1.5 percent of cases. Dieulafoy says it occurs in at least a third of all cases. Others find evidence of tonsillitis, acute or chronic, in as much as 80 percent of the cases. The present tendency is toward the higher figures. Recent writers, employing more thorough methods of examination of the tonsils, find these organs diseased as a rule in a much higher percentage of cases of acute rheumatic fever than was formerly the case.

In a series of twelve cases of acute articular rheumatism, Morris has had both tonsils removed during the height of the fever. Where there was an active tonsillitis he waited for the latter to quiet down, but otherwise went ahead regardless of the general infection. His results were satisfactory. No case of the series developed endocarditis or other complication, and this even though the streptococcus viridans was found in the blood of one of the cases. The local reaction to the tonsillectomy was negative, and its effect on the fever and arthritis often strikingly good. The method certainly deserves a trial.

THORACENTESIS IN INFANTS.—Gittings, Fetterolf, and Mitchell (*Am. Jour. Dis. Children*, Dec., 1916). In the course of a topographic study of the pulmonary fissures and lobes in infants, the writers point out that the lungs do not extend to as low a level in the thoracic basket in infants as in adults, and that the level of the diaphragm is correspondingly higher. If thoracentesis must be performed in the infant, the puncture should be made at a higher interspace than is customary in adults. The sixth intercostal space in the axillary region and the eighth interspace near the angle of the scapula represent the lowest permissive points for thoracentesis in early life.

USE OF ATROPIN IN DIAGNOSIS OF TYPHOID AND PARATYPHOID INFECTIONS.—Marris (*Brit. Med. Jour.*, Nov. 25, 1916). The injection of an adequate dose of atropin sulphate is ordinarily followed by a considerable acceleration of the pulse. In typhoid and paratyphoid fevers, however, according to Marris, this acceleration fails to occur, and this failure to react may be used diagnostically. The test should be made at least one hour after a meal. The patient lies quietly, and the pulse is counted minute by minute until it no longer varies. Ten minutes usually suffices. Two milligrams (gr. 1/33) of atropine sulphate are then injected subcutaneously in the triceps region and the patient is instructed to remain absolutely quiet. After twenty-five minutes the pulse is again counted minute by minute until its rate, if it has risen, is again declining. In general, a rise of twenty or more beats per minute in the pulse rate speaks against the presence of typhoid fever, while a rise of ten beats or less speaks for it. Cases in which the rise in the pulse rate lies between ten and twelve must be considered as showing a doubtful reaction, and in them the test may be repeated a few days later. The administration of the dose mentioned never gave rise to seriously unpleasant symptoms.

HOME MADE BREAD SUBSTITUTE FOR DIABETIC PATIENTS.—Funk Nicholson (*Brit. Med. Jour.*, Jan. 20, 1917). Most of the diabetic and gluten flours sold to the public give a reaction with iodine almost as dark as ordinary flour. They are sold at all prices from 9 s. to 40 s. or more a stone; I do not now order them. Gluten bread even from the best houses is not palatable, and cannot be cut in slices and buttered. Prolacto bread and casoid bread are satisfactory, but they are not very nice to eat, and are very expensive.

For some two years or so I have given up all these flours and breads and I order a bread made of pea-nut flour and casein. This is made for me quite easily in the kitchen of the Hull Royal Infirmary and my private patients make it quite well as home. It has the advantage of being very nice to the taste, and can be cut readily in slices even as thin bread-and-butter. I have now several private cases that have made the bread twice a week and eaten it regularly for a year or two, and they like it.

Receipt:

Pea-nut flour, 8 ounces.

Casein, two ounces.

A pinch of salt.

White of egg, twelve ounces.

The white of the egg is beaten to a snow; then the other ingredients (previously lightly mixed) are slowly added. The bread is baked in a sound oven in a tin.

Pea-nut flour is not expensive, and was offered to me a few months ago at 1s. 2d. for 3 lb. The pea-nuts which are sometimes called monkey nuts, also can be bought. They should be placed on the top of the oven for a short

time, when the husk can be rubbed off with the hand and the nuts ground in a small mill which can be bought for 2s. 6d. Casein can be bought anywhere. The whites of 8 or 9 eggs measure about 12 ounces; though they are just now dear, most good housekeepers have put down a number in a waterglass when they could be obtained at 16 a shilling and these will do very well. The yolks come in for the patients, fried or in any other way, or they can be used in the kitchen for other things.

This bread when tested with iodine gives only the faintest blue reaction. If preferred, the yolks also can be used in making bread, and then only half the number of eggs is needed; but the bread is yellow and I do not think it is so nice. The pea-nut flour can be replaced by almond flour, but it costs more and my hospital cases do not like it so well.

I may add that casein and cream, as suggested by Dr. Williamson in the *Journal* a year ago, have been very satisfactory in my hands.

I have lately treated several cases on the alimentary rest scheme with very good results. It is sometimes called the starvation scheme, but this is a bad name, and one that does not commend itself (under that name) to private patients. I give four half pints of black coffee in twenty-four hours and nothing else; this, I have found, patients will take 3, 4 or 5 days without complaint. By that time the sugar has disappeared entirely from the urine. I then gradually add cabbage 5 oz., and in a day or two an egg, and then one-half a pint of beef-tea, increasing it each day or two (if no sugar appears), so that in 10 or 15 days the patient is getting meat 2 ounces, casein 2 ounces, cream 2 ounces, beef-tea 1 pint, cabbage 10 ounces (or other green vegetables), eggs 3, tea or coffee 2 pints, with cream and some pea-nut butter with bread.

MISCELLANEOUS

PREPAREDNESS WORK AMONG THE ROENTGENOLOGISTS.

At the request of the Council of National Defense a Committee of Preparedness was appointed by the President of the American Roentgen Ray Society. This committee consists of the following members: Lewis Gregory Cole, George W. Holmes, Leopold Jaches, Willis F. Manges, and Harvey W. Van Allen, with an auxiliary Advisory Committee on which the following men have been asked to serve:

Frederick H. Baetjer.
David R. Bowen.
Eugene W. Caldwell.
James T. Case.
William D. Coolidge.
Arthur C. Christie.
H. W. Dachtler.
Kennon Dunham.
Arial W. George.
Alfred L. Gray.
Roland Hammond.

Preston M. Hickey.
Walter C. Hill.
P. W. Huntington.
George C. Johnston.
Frederick Manwaring Law.
Henry K. Pancoast.
George E. Pfahler.
John S. Shearer.
Edward H. Skinner.
Albert Soiland.
W. H. Stewart.

The work planned by this committee has three divisions:

1. The canvas of the country for a complete list of medical men available for military roentgenology.
2. The establishment of schools in different geographical centers where uniform instruction in military roentgenology may be obtained.
3. Preparation of a manual on military roentgenography.

A circular letter has been sent to many roentgenologists, but the Committee greatly desires to reach all men engaged in the work. This specialty is one of the most important branches of military surgery and the workers are comparatively few. Therefore we most earnestly urge that all roentgenologists who possibly can will do their "bit" and volunteer their services to the country.

In order to have this service of the greatest efficiency it is hoped that all roentgenologists will adopt the uniform technic which will be worked out by representative roentgenologists throughout the country. This technic will be described in the manual and taught in the schools.

Men willing to volunteer will kindly communicate with the Committee of Preparedness of the American Roentgen Ray Society with headquarters at Cornell University Medical College, First Avenue and Twenty-eighth Street. *New York City.*

NOTICE.

We desire to warn our readers that the INTERSTATE MEDICAL JOURNAL and the Modern Hospital Publishing Company have no connection whatever with a party calling itself the Interstate Medical Institute, whose representative appears to be one C. B. Schoenfeld, M. D.

From correspondence that has come into our possession it appears that this man Schoenfeld is in the habit of selling merchandise and receiving a sum in advance. In one instance a check cashed by him in Texas was dishonored on presentation. The letterhead used shows offices in many cities, but letters addressed to the chief office in Chicago have been returned.

We suggest that our readers be extremely prudent in dealing with any agent of this concern, and if they meet one they should communicate with Edwin D. McKeever, attorney Kansas State Medical Association.

BOOK REVIEWS.

THE SURGICAL CLINICS OF CHICAGO. Vol. I, No. 1, (February, 1917). With 83 illustrations. Published bi-monthly. Philadelphia and London: W. B. Saunders Company. Price per year, \$10.

It is self-evident that a detailed review of a heterogeneous set of clinical presentations is not in the order of the day. There is, however, so much of essential value and so much of promise in this first volume of "The Surgical Clinics of Chicago" that one feels the impulse to speed them on their way with a congratulatory word.

There are in all twelve clinics, held by Drs. Bevan, Ochsner, Andrews, McArthur, Lewis, Beck, Kanavel, Eisendrath, Speed, Plummer, Ryerson, and Phemister. The material is presented in interesting fashion, well edited, and sanely and intelligently illustrated. All in all, this means that the Chicago Surgical Clinics bid fair to serve as pleasant, worthy instructors. Undoubtedly the value of this number would have been greater if the editor had seen to it that the text contained here and there references to surgical literature.

CLINICAL TUBERCULOSIS. By Francis Marion Pottenger, A. M., M. D., LL. D., Medical Director Pottenger Sanatorium for Diseases of the Lungs and Throat, Monrovia, Cal.; Professor of Diseases of the Chest, College of Physicians and Surgeons, Medical Department, University of Southern California, Los Angeles. With a chapter on laboratory methods by Joseph Elbert Pottenger, A. B., M. D., Assistant Medical Director and Director of the Laboratory, Pottenger Sanatorium. Two volumes, Vol. I, pp. 707, with 111 illustrations; Vol. II, pp. 713, with 66 illustrations. St. Louis: C. V. Mosby Company, 1917. Price, \$12.

Special attention may be called to the chapter in this volume on Tuberculosis in Children, beginning with the natural defense of the child, briefly reviewing the production of specific immunity. Those factors predisposing the child to tuberculosis are considered. Several interesting tables are shown illustrating graphically the frequency of infection, according to various age periods, and based on the positive reaction to tuberculin tests. The general practitioner will find it exceedingly difficult at times to differentiate between nontuberculous cervical adenitis and glandular tuberculosis. The diagnosis of glandular tuberculosis is not always an easy task, and the pages devoted to this subject are worthy of careful perusal.

The chapter on Traumatic Tuberculosis, with report of a case, is exceedingly interesting. Until recently comparatively little attention has been given this phase of the subject. A review of this chapter will at once impress the physician with its importance, not alone from a medical, but from the medico-legal standpoint as well. Chapter XV considers in detail the diagnosis of early pulmonary tuberculosis. We are constantly emphasizing the fact that tuberculosis must be diagnosed early to be cured. Dr. Pottenger in this chapter shows the possibility of overlooking early tuberculosis by failure to examine methodically. This chapter is worthy of careful study by all who would familiarize themselves with the early pathological changes occurring within the lung structure itself, as well as those changes in the muscular structure and integument surrounding the chest wall.

On page 413 Dr. Pottenger gives the method of eliciting the so-called "Wheaton sign," as observed by the present reviewer at the Rush Medical

College and reported in 1910 in the *Journal of the American Medical Association*, under the title, "Integument Atrophy, a Sign of Diagnostic Importance in Early Pulmonary Tuberculosis." While it is not incumbent on every author to accompany his text with a bibliography, credit should be given those who have made important observations of practical value, and in this instance, an observation so freely made use of in the text, Dr. Pottenger fails to credit the original observer of these integumentary changes with his work. More than this, in his reference to these phenomena, Dr. Pottenger uses language which might be taken to imply that the discovery of these integumentary changes and the method of detecting them was part and parcel of his own work, whereas in fact this latter was confined to the muscular changes referred to in that place.

The limitations of climate are noted in a chapter devoted to this subject (Vol. I). It is not recognized as the main factor in the treatment of tuberculosis. The author states that a "country which invites patients to be out of doors, and which offers physical surroundings in the way of natural scenery and vegetation which are pleasing to the physical sense, will undoubtedly improve the patient's chance of recovery. "We are sure, however, that Dr. Pottenger believes that no thoughtful physician will prescribe climate, notwithstanding these advantages, without due regard to the circumstances of the patient or stage of his disease. Failure to do this has in the past opened the door to many regrets that have harassed the minds of thousands of patients at a time when they most required repose.

Chapter XVIII considers tuberculin tests in diagnosis, and the theory of their reaction is discussed. An interesting chapter on the x-ray as an aid to diagnosis follows. The necessity for skill and judgment in the interpretation of the plate is emphasized. Failure to properly interpret x-ray plates is a common occurrence, especially in the absence of definite physical findings and clinical history.

Volume II consists of 713 pages and is devoted to complications and treatment.

Chapter XLVIII (Vol. II) reviews the sanatorium treatment of tuberculosis.

These two volumes practically cover the field of tuberculosis, and embody the observation of Dr. Pottenger covering a period of twenty years, the studies having been made in large measure at his private sanatorium.

Pathological problems are presented in a practical way and from the point of view of a clinician. Diagnosis is considered in its relationship to physiology and functional pathology. The author, as he states, has endeavored to explain the physiological basis of the more important measures employed in treatment in the hope that such an understanding will produce a more intelligent therapy than that which is practiced today. The work is essentially a series of monographs, presenting in a clear way the subjects under discussion, and will prove valuable as a work of reference.

EMERGENCY SURGERY. By John W. Sluss, A. M., M. D., F. A. C. S., Associate Professor of Surgery, Indiana University School of Medicine, etc. Fourth edition, revised and enlarged. With 685 illustrations, some of which are printed in colors. Philadelphia: P. Blakiston's Son & Co. Price, \$4.

This brochure, aside from a recasting of the text pertaining to war surgery and wound infections, appears in about the same form as the previous edition. As a handy, practical manual, it has much to commend it as a volume to be packed in the grip of the medical reservists called to colors.

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EDITORIAL.

ORANGES OR SALADS?

There is a tendency to talk so much about calories as a measure of food value, that other essential characteristics of food are apt to be lost sight of. Not infrequently, articles in the lay press, intended to guide the profane, are good instances of the blind leading the blind. I read recently in a New York Sunday paper, an article by an alleged "food expert," in which he said that calories were especially contained in peas and beans, and that they were flesh-forming things!

Since the time of Captain Cook, it has been known that, unless a certain amount of antiscorbutic food is taken, scurvy is likely to be produced. The nutritional researches of Hopkins, Mendel and other biochemists, and the scientific examination of beriberi, pellagra, and other diseases have shown that, in addition to the caloric and gross chemical value of foods, there are certain subtle accessory factors which are necessary for growth, or for maintenance of health. What these accessory factors are we do not know definitely, but they are contained in various foods; some of them are found only in raw food, while others will withstand the action of heat.

Many of the foods which, if eaten raw, might be depended on to yield the necessary thermolabile accessory factors are foods particularly liable to be contaminated and thereby to convey disease. Such are the green salads. This is notably true of those salads grown by orientals, who are especially liable to be hosts of intestinal parasites. This objection cannot be urged against oranges, lemons, grape-fruit, and other foods having a rind to protect them from contamination, which rind is removed before the pulp is consumed. It will be seen, therefore, that it is wise to depend largely on this group of foods for that constituent of the accessory factors which is destroyed by heat.

At the present moment this point of view acquires additional importance because we are being urged on all hands, not only to practice the greatest economy in food, but also to grow much of our own food. Now we are recommended to grow green vegetables, salads, radishes, or tomatoes which are esthetically desirable but none of which have any serious caloric value, while they are not superior to the orchard fruits in accessory factor value. They are easily contaminated, and they occupy, in the ground, room which might be advantageously taken up by nourishing vegetables such as peas, beans and potatoes. Now I am not suggesting that the cultivation of onions, tomatoes, lettuce, etc. should cease, but only that it should not be extended, but rather diminished, to make room for true food crops.

In the case of the food plants that I am mentioning, they are all annuals and there is usually but little economic difficulty, so far as the soil is concerned, in substituting some other plants. But in the cases of the orchard crops, oranges, lemons, grape-fruit, apples, etc., the enormous capital invested in the trees and in their cultivation prohibits substitution, in those orchards, of other crops.

In one respect, the citrus fruits have, in the connection with which we are dealing, an advantage over their rival, the grape. For the juice of the grape contains up to one percent of tartaric acid. The tartrates (including tartaric acid) have been attacked, in a somewhat half-hearted way, in the *Journal of the American Medical Association*, on the ground that they might, in massive doses, be injurious in certain kidney conditions. While I do not think that anyone takes this highly theoretical objection very seriously, and while certainly no one from the grape countries, such as Syria, where nephritics consume up to seven pounds of grapes a day with nothing but beneficial results, will attach the least importance to it, yet, it is worth while to say that even those who attack grape juice, have nothing but blessings to bestow upon the citric acid and citrates yielded by oranges.

The mineral constituents of oranges are of undoubted value, as are those of most vegetables, and it is quite probable that these mineral constituents are more available in raw than in cooked vegetables.

Finally, there are many conditions in which it is desirable to take advantage of the capacity that the body possesses for the oxidation of citric acid, with the result of correcting any overacidity of the urine.

At the present time, therefore, the orchard fruits, and especially the orange, of which there is abundance, should be destined to play an important role in the struggle for dietetic economy and for the increased production of energy-furnishing foods.

THE FUTURE OF THE PHYSICIAN.

The minds of most of us have been much exercised with speculation on what is the future of our profession and, in particular, of that large element of it constituted by the general practitioner. Reviewing the divisions and subdivisions of the subjects with which we deal into specializations and subspecializations and the increasing facilities in communication, one is tempted to contemplate as a probability the practical disappearance of the general practitioner from all but the remotest districts.

The principal loss that the community would suffer, in such an eventuality, would apparently be that there would no longer exist that personal relation between the practitioner and his patient which exists in the case of the family physician.

Nor is there any indication that either of the other professional advisers of the family, the minister and the lawyer, is showing any tendency to increase his personal influence to replace that lost by the physician.

In this issue, we are publishing an article by Dr. Pottenger which contains a thought relevant to this question, and which seems, to me at any rate, novel. You will find that Dr. Pottenger seems to regard specialization as merely a temporary phase in the elaboration of medical technic and science. He considers it necessary in order to deal with a vast amount of undigested material, to eliminate a great deal of what will subsequently be found to be unnecessary complication. He views as possible an ultimate simplification, which will result in the return of what is now special work into the sphere of a general practitioner. Whether Dr. Pottenger's views are correct or not, the future alone can decide, but they certainly merit thoughtful consideration.

There is another aspect to this question which has received more consideration. Most of us are familiar with the story that the Chinese pay their physician as long as they remain in good health. We can remember when this was considered one of the cardinal instances of Oriental topsy-turvyism, but we have become so accustomed to the idea of health insurance that we now realize that the alleged Chinese plan is but one practical solution of that problem, economically, no doubt, an unsound solution, because the risk is not spread over a sufficiently broad base. There is, here, however, the germ of an idea which must have been in the minds of many of us. It will, it must soon become the practice for every man, woman, and child, even in apparently good health, to undergo at regular intervals a proper medical examination, for the purpose of preventing, cutting short, or treating any morbid condition. If such a practice be established it is fairly clear that it will, for each family, be carried out by a family physician, who will, perhaps more than ever, stand in the position of the honored counselor.

THE SALVARSAN PATENT AND OUR LASTS.

There is at present going on an intensive campaign for the abrogation of the patent on salvarsan.

The perusal of the letters and articles on the matter, contributed to the medical press, produces, on the legally trained mind, much the same impression as must be felt by a musician on entering a room in which a number of unskilled performers are simultaneously practicing various tunes, on instruments of incompatible pitch.

Law is confounded with ethics, international agreements confused with municipal law, issues as disparate as professional etiquette and patent law as treated as though all of the sets of rules involved were similarly sanctioned. The writers pass from the particular to general, and in the reverse direction, as rapidly as a shuttle in a loom,—but without weaving a pattern. Abrogation, confiscation, suspension, sequestration, retroactive laws, all are invoked.

Let us unravel this confused tissue and, with its threads and a few of our own, let us weave a consistent and orderly pattern.

A patent once granted is property, just as much as a mining claim. Such a right cannot be confiscated without compensation or abrogated except on certain conditions expressly laid down in the law under which it was granted.

This is fundamental: this must constitute the point of departure of all reasoning on the subject. No amount of hard names such as "Monopoly" can break the backbone of a patent right. The confiscation of the slave owner's right of property has been cited against this contention. But in rebuttal, we urge that, in the first place the measure in question was a war measure and, what is very much more important, it was a law of general and not only of particular application. What we are now being asked to support is the confiscation of one particular right.

There is, however, one exception to our general rule which, because it is relevant to the present issue, must be dealt with. An enemy alien has theoretically no legal rights, but, partly by international agreement, partly by motives of self-interest, it has been the practice of belligerent nations to regulate their conduct towards rights vested in enemy aliens by the principle of reciprocity. Thus, for example, the British government has sequestered in the hands of the Public Trustee all patent rights substantially owned by enemies. These are being administered directly or through licensees. At the close of the war an account will be taken, and, as an enemy government shall have dealt with British owners of patents, so will the British government deal with enemy owners of British patents.

It seems unlikely that the United States Government, which is in

this war, far more than any of the other belligerents can pretend to be, for matters of principle, will go further in the direction of confiscation than the British government has seen fit to go.

In the patent laws of some countries there is a provision that the patented process must actually be worked in the country granting the patent. In other instances, all that is required is that the reasonable needs of the grantor country shall be met. A certain time of grace is usually accorded. The sanction for contravention of these provisions is usually abrogation of the patent or the issue of compulsory licenses.

I am advised that the patent law of the United States contains no such provision. Had it contained some such a condition as the second of those cited above, there might have been put forward, in the case of the salvarsan patent, the universally admitted defense, availing at any rate against confiscation, of *vis major*. Since the commencement of the war, it has been impossible for the manufacturers to provide for the legitimate needs of our population.

Reverting to the question of enemy ownership, it is not clear that those who clamor for abrogation have satisfied themselves, on good grounds, that the American patent rights in salvarsan are in fact substantially held in Germany. Many of them frankly state that the nationality of the owner is indifferent to them; they are asking for the confiscation by Congress of a particular right, because they do not approve of the manner in which that right has been exercised. The difficulties in the way of such special confiscatory legislation have already been mentioned. Except in the improbable case of the exercise of a belligerent right against an enemy, a law would be required, and it is almost inconceivable that such a law would be upheld as constitutional by the courts.

If things were to be pushed as far as they legitimately could be, a measure of expropriation in the public interest is apparently the only available remedy. Such a measure would necessarily provide for adequate compensation.

Some of the writers have apparently understood that a particular confiscation is not feasible, and have proposed the enactment of retroactive laws dealing with the general question raised. It is in general, contrary to sound principles of legislation to pass retroactive laws, especially when they are punitive in character. How many of us, for example, would support a law laying down that no one may continue in the practice of medicine unless he passes, immediately, a strict examination in all the subjects of the present medical curriculum? Yet, by requiring all present-day students and graduates to follow such a curriculum and to pass such an examination, we show our belief in the necessity of the knowledge involved, for the due qualification of a medical practitioner.

Sometimes, however, retroactive legislation is possible without

substantial injury to vested rights. It would be possible to pass a law that all patents granted or to be granted in the United States shall be worked here, after a due period of grace. This, however, is very far short of abrogation.

Truth to tell, we physicians are justly accused by the lawyers of the neglect of general principles. Dealing as we do with the most variable of all possible factors, the human being, we have an almost irresistible tendency to deal with every case on its merits, and to believe that the same method can be applied in legal affairs. In a system founded, as the Federal laws of the United States are, upon English common law and, therefore, giving authority to precedent, such a method as ours would lead to hopeless confusion and the wrecking of the whole judicial machinery. This is what lawyers mean when they say "Hard cases make bad law."

It would be better to formulate our grievances, leaving to experts the selection of a remedy. Otherwise we may be told that "Cobblers should stick to their lasts."

AMONG THE PROPHETS.

We cull the following from the *Journal of the Iowa State Medical Society*:

"It was regularly moved by Dr. Frederick Peterson and seconded by Dr. Samuel W. Lambert that it be resolved that in the opinion of the committee, the drug heroin is of no real value in the practice of medicine, and that its place may be better taken by more efficacious agents that do not menace public welfare.

"Resolved, That the committee recommend Federal legislation to prevent the importation, manufacture and sale of heroin in the United States of America."

What a grand and glorious feeling it must occasion to know oneself omniscient, freed from the reservations and limitations that hamper ordinary mortals, to know that the future holds no secrets for us, to be sure that we are right in recommending legislative action to cut short the activities of those of our professional brethren who venture to differ from us, and to render impossible the discovery of new uses for a drug of which we disapprove.

Once upon a time three tailors wrote a petition to the British Parliament, commencing in these words, "We, the People of England."

COLLECTIVE ABSTRACTS

TUBERCULOSIS IN INFANCY AND CHILDHOOD.

By JOHN B. HAWES, 2nd, M. D., of the Editorial Staff.

METHODS OF INFECTION.

Adrian¹ in a practical and sane article of distinct value to the general practitioner emphasizes the fact that tuberculous infection begins in early life in the home circle. A positive von Pirquet reaction in early life signifies a bad prognosis. He speaks of the importance of milk as a factor in such infections and urges that the pasteurization of milk be generally adopted.

Minor¹⁶ strikingly emphasizes certain important factors in regard to infection with tuberculosis, for instance he says: "Tuberculous infection probably never, and certainly rarely can occur outdoors," and that even indoors it usually takes a prolonged exposure under insanitary conditions for *adult infection* to occur. He does not believe that the clean, intelligent consumptive is of danger to those in the house with him, *if they are not* children or young people. He believes, therefore, that our attention should be focused on preventing infant and childhood infections, and that our chief problem lies in the question of protecting our children. Kissing children on the mouth should be prevented, milk should be pasteurized, coughing mothers and nurses should be examined; outdoor schools for well children should be encouraged, over-strenuous athletics discouraged. The doctor must not wait for symptoms to develop in the children under his care, but by careful supervision over their habits, school and home life, play and work, and by regular examinations should endeavor to prevent the occurrence of such symptoms. This article is full of sane and sound advice.

Pottenger²⁰ discusses in detail the part played by the lymphatic system as a protective agent against tuberculous infection and disease. He makes a plea against too early removal of tonsils and adenoids.

Ravenal²² discussing modes of infection states that the intestinal tract in children is a frequent source, and that likewise to him the tonsils appear to be the portals of entry in many cases.

Ustvedt²⁶ presents figures showing how much greater is the infant mortality in families where there is an open case of tuberculosis, as compared with normal families. While his figures present nothing new, they emphasize the need of removing infants at once from a tuberculous environment. Such figures as here shown are of striking interest, and should be utilized in educating parents as to the necessity of such removals.

Von Weller²⁷ reports two cases of miliary tuberculosis of the placenta with clinical, though latent, tuberculosis of the mother. He concludes that the transmission of tuberculosis from mother to child prior to birth may not be so rare as usually thought to be the case.

DIAGNOSIS.

Dana⁴ is of the opinion that the average general practitioner is not sufficiently impressed with the importance and frequency of tuberculous infection

in childhood and especially of the difference between infection and disease. He urges that children "below par" for any unexplained cause be given strict hygienic treatment and careful examinations by an expert. He also observes that in almost no case is x-ray evidence alone sufficient, and that it does not distinguish between latent cases and those needing active treatment.

Floyd, Boutwell & George⁸ have made a careful and exhaustive study of bronchial gland tuberculosis in a large series of children, with detailed x-ray studies, and have come to sane and sound conclusions. Percussion is of value in the larger masses of glands, d'Espine's sign need not be present in order to make a diagnosis, but only on a large number of comparatively minor signs and symptoms can a correct diagnosis be made. This article is of great importance and value.

Lapham¹⁵ discusses the symptomatology of bronchial gland tuberculosis and especially the relation of such enlarged tuberculous bronchial glands to acute fulminating cases of tuberculous meningitis. She believes that in almost every case careful post mortem examinations will show a definite relation between the glands and the subsequently occurring meningitis. Likewise she is of the opinion that spinal disease may be closely related to bronchial gland tuberculosis. She describes the various aches and pains of vague and indefinite nature elicited by pressure or otherwise, that may be attributed to these glands.

Morse¹⁷ discussing d'Espine's sign states that the normal change of voice occurs between the seventh cervical and the first dorsal spine. The d'Espine sign is positive, therefore, when the bronchial voice or whisper is heard below the seventh cervical spine. It is uncommon in children of the well-to-do and, when present in them, is probably not a manifestation of tuberculosis in more than 50 percent. It is to be doubted if even the opinion of such an authority as Dr. Morse would be concurred with by many of those who have studied this subject. Many believe, for instance, that an increased whispered voice or bronchial whispered voice may be heard as low as the third or fourth dorsal spine and be within normal limits, and that *in the absence of other signs and symptoms* the diagnosis of tuberculosis of the bronchial glands is *not* justified upon a positive d'Espine sign alone.

Overend and Riviere¹⁹ describe the location of the various glands around the root of the lung and group them as follows according to clinical manifestations, (1) normal with no physical signs, (2) with right paravertebral dullness, (3) with double paravertebral dullness, (4) with parasternal dullness on one or both sides. They describe the features of each of these groups as seen by means of the x-ray. They conclude that thoracic glandular tuberculosis is very common in children of school age, especially in urban districts, but that there are likewise notable powers of resistance to control these infections, even to extensive ones. They believe that both clinical and radiographic methods of diagnosis are of great and equal importance in diagnosis and should be used together in each case.

Reuben²³ discussing the diagnosis of tuberculosis in infancy and childhood, is strongly of the opinion that fever is the first sign of such infection in infants and that its course is a fairly typical one. In such cases, according to his experience, the tuberculin test usually becomes positive at the onset, or a few days after the onset of the fever, although no physical signs are present at the time. He states that 30 percent to 35 percent of such infants survive these infections. The general trend of opinion would hardly support these statements either as to diagnosis or prognosis, although his ideas as to treatment are sound.

Smith and Bibby²⁴ always tried to answer the following two questions in every case brought to their clinic. Has the child been infected with tuberculosis? This is answered by the tuberculin test. Is the infection latent or

active? This was answered by a careful study of the history, signs and symptoms which they describe in detail. Impaired nutrition, anemia, undersize, and failure to gain weight are important points. Fever, over a considerable length of time, was suggestive. Loss of appetite, fatigue, are valuable symptoms. Cough and positive chest signs are rare.

Weith,²⁸ discussing the greater incidence of tuberculosis in Lausanne as compared with other Swiss cities, raises some interesting questions as to what is to be gained by applying the von Pirquet test to all the children in the city. In view of the fact that upwards of 90 percent of all children of school age are already infected and would thus respond to such a test, what in particular is to be gained by applying it? He believes, and rightly so, that of far greater importance than this is the elimination of the sources of infection.

TREATMENT.

Dowd⁵ reports on the results of 687 cases of tuberculous cervical adenitis treated by a radical operation. His results are good and he is an enthusiastic advocate of this method.

Gauvain⁹ emphasizes the fact that heliotherapy alone cannot accomplish wonders, but that it should be used in conjunction with other methods of treatment. Beneficial effects cannot be obtained unless the skin is pigmented. He gives rules for treatment along the usual lines.

Golden¹⁰ urges more conservative treatment with tuberculin, hygiene, etc., Morris¹⁰ likewise reports good results without radical surgery, using x-ray, tuberculin, and hyperemia.

Holding¹¹ is enthusiastic over x-ray and believes that conservative methods should be tried before radical excision.

Howell¹² believes that the primary lesion is represented by a mass of glands usually around the roots of the lungs. The three essentials of treatment are rest until long after all symptoms have disappeared, fresh air and sunlight. He makes no mention of tuberculin in treatment.

The Weekly Bulletin of the New York Board of Health for June, 1916,²⁹ describes a group of children under observation at an Italian tuberculosis clinic in New York City who had been undergoing systematic and regular corrective gymnastic exercises during the year. Such classes and such exercises form an important part of preventive work among children.

Albert-Weil² believes in x-ray and conservative surgery.

PATHOLOGICAL AND BACTERIOLOGICAL STUDIES.

Dunn⁶ discusses the source and mode of infection by tuberculosis in early life with special reference to the work of von Pirquet, Ghon, and others. The diagnosis he bases in physical signs in the chest, such signs being absent in nearly 50 percent of his cases; tuberculin tests, these were negative in 50 percent of his cases, and x-ray examinations, which were positive in every case.

Eastwood and Griffith⁷ in 261 cases of bone or joint tuberculosis found the human bacillus in 196 cases, bovine in 55, and atypical forms in 10; in 155 cases under 10 years of age 29 percent was bovine; in 106 cases over 10 years only 9 percent was bovine.

Marfan¹⁸ discussing the occurrence of tubercle bacilli in milk urges that all cow's milk be boiled or pasteurized as the most practical method of preventing the source of infection.

SOCIAL AND ECONOMIC PROBLEMS.

Jeanneret¹³ believes that it is largely by means of the school and the care and instruction of school children in health matters that tuberculosis is to be

stamped out. Between the years three and five the lymphatic system prevents any tubercle bacilli from entering the body. Such a child is not diseased, but merely infected or sensitized. It is our task to distinguish between those who are merely so infected and those who are actually diseased because the barriers of defense have broken down. He urges that each child have his health chart, and that the von Pirquet test be applied once a year. He describes a system of gymnastic exercises performed in the open air with the children's bodies stripped to the waist. Such exercises should be largely thoracic. Fully an hour every day should be devoted to this purpose.

Kingsley¹⁴ presents a program for the promotion of welfare of children and the prevention of tuberculosis among them. This work is along the following lines (1) The creation of institutions and agencies for the care and relief of those who have tuberculosis and for safe-guarding their families. (2) The conduct of a vigorous educational campaign with especial reference to training and educating the child in matters pertaining to hygiene and physical welfare.

Stern²⁵ urges that measures be taken to decrease the mortality of tuberculosis among children of school age by improving the personal and home hygiene. Teachers and social workers should play an important part in this work.

PROGNOSIS.

While opinions differ as to the prognosis of tuberculosis in infancy, Combe³ is of the opinion that while it is very grave it is not absolutely fatal. The younger the child the less the powers of resistance. The virulence of the infection is an important factor, while the clinical form of the disease is a still more important factor. If the disease when discovered is still localized to glands, the outlook is less serious.

Permin²¹ believes that only during the first year of life does a positive skin test indicate a grave outcome.

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STERILITY IN THE MALE.

By JOHN R. CAULK, A. M., M. D., of the Editorial Staff.

There is scarcely a phase of medicine which bears more practical importance to married life and to the community as a whole than the accurate determination of the cause of the childless marriage. The ancient idea of incriminating the woman for such responsibility still persists. Talmey states that "without exaggeration in 99 out of 100 marriages not only the husbands, but the wives themselves, attribute the sterility to the diseased womb," and it has always been the custom for the wife to submit to examinations and operations for the correction. This idea has prevailed because in the male, the ability to copulate and produce an ejaculation of semen have seemed sufficient evidence of his procreative power; whereas in the female the process of ovulation is obscure and more readily suspected. It has been variously estimated that the male is responsible for family sterility in from 25 to 70 percent. This is readily understood when we consider the great proportion of the adult male population who have had gonorrhea, which, with its complications, is the most frequent factor. Benzeler, a German army surgeon, was able to follow the histories of 473 patients after marriage. He found that of those who had had simple gonorrhea, 10 percent were childless; of those whose gonorrhea was complicated with unilateral epididymitis, 23.4 percent were childless; and of those who had bilateral epididymitis, 41.7 percent were without children, demonstrating the importance of the obstructions to the seminal tract.

In this abstract male sterility alone will be considered. Sterility from malformation, maldevelopments, and impotence will not be discussed. Nor will we consider either voluntary or temporary sterility, or the absence of spermatozoa from sexual exhaustion due to abnormal demands on the sexual organs.

As previously stated, gonorrhea forms the most important factor in the production of sterility. Neurasthenia and the neuroses have been classed as causes for sterility, but they are more often a result than a cause. Diseases of the central nervous system, when causing sterility, usually produce it through absolute impotence. The x-ray has occupied a prominent place as an important factor. Some authors believe it not often responsible for permanent sterility. Concerning syphilis and tuberculosis, Cary believes that they have been overestimated as a cause. He quotes Bangs-Hardway as saying that, except as causing cachexia with destruction of the testicle, it is doubtful whether syphilis influences the condition of the semen. Heidingsfeld, Lewin, and Hank are of the same opinion. With reference to tuberculosis, Gross found that the semen of consumptives contains spermatozoa as frequently as that of normal individuals. Of course, tuberculosis affecting the epididymes themselves would cause sterility by mechanical obstruction. Alcohol has been considered by some to have a deleterious effect on testicular function. Simmonds states that in chronic alcoholism it occurred in 61 percent, due probably to fatty degeneration. The immoderate use of tobacco and certain other drugs may produce a deleterious effect on the production of spermatozoa. Obesity is considered also an etiological factor. Kich found that 9 percent showed complete absence of spermatozoa. Senility and operations on the bladder, prostate, and vesicles, and disturbances of the ductless glands are other factors in the production of sterility. Little, of Rochester, recently reported a case of hyposuprarenalism associated with sterility. The semen was free from

spermatozoa, but, after the administration of dried suprarenal cortex, spermatozoa were found in the secretion. He did not state the character of motility, and of course the question of fertility is still in doubt. Lespinasse has done, in the last few years, very valuable work on this subject. He gives as a criterion of a sterile marriage the following: any couple that has been married three years and that has had no children, and that has used no means to prevent conception. This, however, is subject to some error, as 7 percent of fertile couples have children after three years. In determining the cause of sterility, Lespinasse says one should take into account the following consideration: obstruction in the sexual tract in the male; obstruction to the sexual tract in the female; absolute failure of or imperfect development of the essential male elements; absolute failure of or imperfect development of the essential female elements; alterations in the secretion of the female sexual tract, so that her secretions are destructive to the life of the spermatozoa. There should be added to this also alterations in the male secretion—namely, pus and toxins from the prostatic and vesicle infection.

As previously stated, we will not consider either the obstruction or alterations of secretion of the female tract. Obstructions of the epididymes are by far the most frequent causes of azoospermia. Such strictures may, however, occur anywhere along the seminal tract from the vas to the ejaculatory duct. An interesting cause of sterility which has been observed by the writer in two patients has been a blocking of the tract by exudate, one of whom had not had gonorrhea. Spermatozoa promptly appeared in the secretion after a vasopuncture. Obstruction from tuberculosis of the seminal tract is quite frequent, and fortunately so. Concerning the semen itself, Reynolds has given a very interesting description of the character and vitality of the spermatozoa. The mere presence of spermatozoa in the secretion does not stamp such a secretion as possessing fertility. The most accurate method of determining the motion and character of the spermatozoa is to obtain them from the female tract. Reynolds, in his study, found in the vaginal pool innumerable spermatozoa in a single field of the microscope; from the cervix there are only from 20 to 30, whereas in the secretion from the fundus, after long searching, a single spermatozoa is regarded by him as a normally high occurrence. He believes that, besides judging fertility from a numerical standpoint, the question of the vitality and the quality of motility is extremely important. He divides the normal motility into three stages: the initial motility which is seen in a fresh specimen, consisting of a lashing of the after part of the tail from side to side, which is so rapid as to cause vibration. The motion is forward in a straight line. The head, middle piece, and front part of the tail maintain their position in a straight line. Such spermatozoa move across the microscopic field in about five seconds. This type of motion he calls progressive vibratile. This type of motion, after a period, passes into the second phase, which differs from the first not only in character, but a reduction of speed. In this the tail movement is a long stroke from side to side, almost the whole tail partaking in the motion; the head and middle piece also swing, and, instead of being straight, the spermatozoa produce an arc. Spermatozoa at this stage show choice of direction, and go up to objects from which they later make off as though the movement were caused by tactile reaction. This he calls the undulatory tactile movement. The third type of motion consists in the spermatozoon pushing itself against cells or objects and bunting itself against it with a slight burrowing motion by a lashing tail movement. The tail movement is vibratile, but less so than the first type. This he calls a stationary bunting. This latter stage is less universal than the others. This theoretical explanation of the cycle he applies to the function of the spermatozoa. Thus the vibratile motion of the early stage is suitable for the

journey up the cervix and uterus, where its direction must be straight and rapid. Reynolds considers the undulatory tactile adaptable to the spermatozoa in the tube, where its success is dependent rather on finding the ovum than on progress. The third or bunting stage he thinks is adaptable to the passage of the spermatozoa through the egg membrane. This is a very pretty theoretical explanation of the motions of the spermatozoa. Reynolds believes that the estimation of the vitality of the spermatozoa by the character of their motion is simpler, and requires less observation and a much smaller number of hours for the determination than the duration of motion tests.

The alteration in the secretion of the male genital glands can have an important influence on the vitality of the spermatozoa. While there are innumerable cases in which the prostatic and vesicle secretions are loaded with pus in individuals who are fertile and whose spermatozoa seem uninfluenced by the infection, there are many cases in which the semen contains innumerable spermatozoa in the presence of pus, which are either dead or materially interfered with by its presence. Such individuals will often become fertile, spermatozoa regaining normal activity after removal of infection from these organs.

In the diagnosis of sterility in the male, one must go thoroughly into the history of past diseases, traumas, and exposures which might have a practical bearing on its presence. If spermatozoa are not found and no constitutional disorders can be determined, the most frequent cause to look for is mechanical blocking in the epididymis or tract. If spermatozoa are found, their number, character of motion, and vitality must be determined. In obtaining a specimen from the male, several methods may be used: first, the expression of his seminal vesicles and prostate by massage and stripping; second, the product of ejaculation brought in a condom; third, the examination of the vaginal contents after copulation. Should the specimen be brought by the male in a condom, it should be placed immediately in a bottle and corked, and this bottle put in a warm medium and brought immediately to the physician. Some observers have had the condom brought to the office by the female by allowing it to be placed in her vagina and retained by cotton packing. This would be ideal as far as proper temperature is concerned, but such a procedure is rather difficult to follow out on account of the inconvenience and embarrassment to the female. It is certainly true that one has to execute great care in the diagnosis of the secretion either with or without spermatozoa in a case of sterility, and repeated careful examinations should be made.

Concerning the treatment of sterility, we have a very important and often puzzling problem. All constitutional diseases should be carefully looked after, and an attempt made to put the individuals in the best possible physical shape. In case of azoospermia due to lack of development consequent on such diseases, the chances of fertility are limited, but are dependent on the careful handling of the cases. Should azoospermia be due to epididymal obstruction, the Martin operation of vasaepididymectomy, or the Hagner operation of crossed vasaepididymectomy—that is, anastomosing the vas to the head of the epididymis—or Lespinasse's operation, offer a fair percentage of cures. Lespinasse has devised a very ingenious operation for such cases of sterility. He forms a false spermatocele at the head of the epididymis, allowing the spermatozoa to collect in the pocket. He then aspirates the contents and makes an artificial inoculation, or, as he calls it, a direct uterine insemination. He reports satisfactory results.

The problem of sterility is a very important one, and certainly deserves more scientific and accurate investigation, particularly of the male.

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ORIGINAL ARTICLES.

SOME ASPECTS OF MALARIA IN CHILDREN.

BY WILLIAM H. DEADERICK, M. D., of the Editorial Staff.

Children are more frequently and more severely affected with malaria than adults. This is probably due to their delicate skin, their manner of dress, sounder and more prolonged sleep, and their inability to defend themselves against mosquito bites. The fact that cases of malaria in children more often escape correct diagnosis may account somewhat for their greater frequency, especially of relapses. About one-fourth of cases diagnosed as malaria, in a large series, were in children under ten years of age.

Children are prone to pernicious attacks, especially of the cerebral type. At least fifty percent of the cases of pernicious malaria in ordinary practice occur in children under ten years of age. The convulsive type is relatively frequent in children living in highly malarial countries, and is more apt to attack children with nervous predisposition, either hereditary or acquired. This form is relatively rare in adults.

In elder children, there is nothing unusual in malarial attacks. In infants and younger children there are several points which deserve a brief consideration.

The type of fever is most often quotidian, sometimes tertian or double-quotidian, rarely quartan. The paroxysm occurs more often during the night than is the case with adults, the fever being often detected for the first time in the morning. The first stage is rarely typical, the rigor being replaced by coldness of the extremities, pallor, slight cyanosis, especially of the lips and nails, vomiting, drowsiness, and sometimes convulsions. During the second stage the fever is often higher than in adults. Gastro-intestinal symptoms, particularly vomiting and diarrhea are common. Thirst is intense. The most common complaints are pain in the head and epigastric region. Enlargement of the spleen is more constant than in adults. Torticollis and erythema may be noted. Atypical forms and dangerous symptoms, especially on the part of the nervous and gastro-intestinal systems are frequent. Edema, ascites and purpura are not uncommon.

In the treatment of malaria in children the best practice is to administer the quinine at short intervals, say every two or three

hours. While children bear quinine in relatively large doses better than adults, the size of the dose should be regulated by the severity of the attack and the age of the patient. In average cases, children from six months to two years of age may be given from $\frac{1}{2}$ to 1 grain of quinine every three hours; from three to five years, 1 to 2 grains; from six to ten years, from 2 to $2\frac{1}{2}$ grains. These quantities may be increased in severe attacks. The drug is ordinarily given by mouth. Where capsules cannot be used, recourse must be had to a tasteless preparation or to a disguising vehicle. Euquinin and tannate of quinine are the best of the tasteless preparations. The former must be given in slightly larger doses, the latter up to double the dose indicated above.

The most efficient liquid for disguising the taste of sulphate of quinine is the syrup of yerba santa, at least one dram of which should be given for each two grains of the quinin. In cases with pernicious symptoms the drug must usually be injected intramuscularly in dilute solution. The best salt for this purpose is the dihydrochloride. Intravenous administration is preferable, but the veins of young children are sometimes very difficult to penetrate. Rectal administration of the solution or suppository may be employed to supplement the other methods. The buttocks should be pressed together for one-half hour after insertion to aid retention.

Inunction of quinine and lard is a common practice in the south. It should not be depended upon as the sole method, but may be employed as an adjunct. I have had no experience with inunctions of quinine and glycerine, which are said to be very effective. Calomel, mercury and chalk and castor oil are the most efficient purgatives in the treatment of malaria in children.

FRACTURE OF THE FOREARM IN CHILDREN.*

BY JACOB GROSSMAN, M. D., New York City.

Fractures at the lower end of the radius occur rarely in children. In smaller children flexion fractures of one or both bones of the forearm take their place. Where a fracture does occur low down, very careful study of the x-ray picture will reveal a fracture near the epiphyseal line. Classical Colles' fracture, commonly seen in adults, is very rare in children. In our series of 150 cases of fractures of the forearm we failed to see a single instance of this lesion. We did observe, on the other hand, a number of subperiosteal fractures occurring at the lower end of the radius. These cases presented themselves with a history of having fallen, striking upon their outstretched hands. Examination revealed slight swelling, disability and marked localized "pencil" tenderness. Ecchymosis, crepitus and false mobility were rarely present.

Ten of this series of cases, who presented themselves with a history of having fallen upon their outstretched hands, had sustained a separation of the epiphysis of the radius. Three of these had, in addition to a separation of the epiphysis of the radius, an infraction of the ulna.

The vast majority of the cases had sustained fractures of one or both bones of the forearm. Sixty-eight sustained fractures of both bones, 82 sustained fractures of one bone, 8 being of the ulna and 74 of the radius. The x-ray findings in these cases were very similar. The fractures were of the flexion or torsion variety in which a complete fracture of the bones was rarely present.

ETIOLOGY.

Of the 150 cases, 106 were in males and 44 in females. The age varied from 13 months to 13 years. There were 33 below 5 years of age, 73 between 6 and 10 years of age, and 44 between 11 and 13. Of those below 5 years of age there were 14 of both bones, 19 of one bone, of which there were 16 of the radius and 3 of the ulna. Of those between 6 and 10 years of age, there were 39 of both bones, 34 of one bone, of which 5 were of the ulna and 29 of the radius. Of those between 11 and 13 there were 15 of both bones, 29 of one bone, all of which were of the radius.

The ages at which fractures occurred more commonly, as shown by this series, are between 6 and 10 years, 73, or 48 percent of the

*Cases shown at a meeting of the Bronx County Medical Society, June, 1917.

cases having occurred during this period. The next most frequent occurrence was between 11 and 13, 44, or almost 29 percent, having occurred at those ages. Below 5 years of age, 33 or 23 percent occurred.

Between 6 and 10 years of age both bones were more frequently fractured, 39, or 53 percent, of the cases occurring at that period, had sustained fractures of both bones. Thirty-four or 47 percent had sustained fractures of one bone. Between 11 and 13 years of age one bone was more frequently fractured, 29 or 57 percent of all occurring at these ages being of one bone. Fifteen or 43 percent were of both bones. Below 5 years of age one bone was more frequently fractured, there being 19 or 58 percent. Fourteen or 40 percent were of both bones.

In the series of 150 cases, one bone was more frequently fractured, there being 82 or 55 percent. Sixty-eight, or 45 percent, had sustained fractures of both bones.

In the majority of the cases the fracture was usually the result of a fall, the patient having struck either upon the outstretched hand or upon the forearm. In a number of the cases there was a history of the forearm having been struck a blow, as in one case, where a swinging door striking the forearm fractured both bones. A slight knock or a mild trauma produced fractures in a few cases. History of former fractures was elicited in 3 of the cases. There was no constitutional disturbance or pathological lesions present in the latter cases to account for the fractures.

SYMPTOMATOLOGY.

Subjective.—These patients were presented with a history of having sustained an injury, with few exceptions. In the latter, especially in the younger children and infants, the parents were not certain that an injury had occurred. As a rule, there were pain and disability. The pain was especially evident when an attempt to palpate the forearm was made. The disability manifested itself in what appeared to be a paralysis of the upper extremity, the latter hanging limply at the side. This was especially so in infants and the younger children. In the older children there was pain on attempting to move the forearm.

Objective.—In the majority of cases where the shafts of the bones were fractured there were angular deformities, varying from a very mild to a severe degree. In those who had sustained a subperiosteal fracture of the lower end of the radius, deformity was absent. It is this type of fracture which is very often overlooked. The absence of crepitus, false mobility and deformity often mislead one and a diagnosis of a sprain or a contusion is made. Ecchymosis is not common and, when present, manifests itself as a slight discoloration. There is usually slight swelling. The characteristic objective

symptom upon which a diagnosis can always be made in this type of fracture is what is known as "pencil" tenderness. This tenderness is localized to the site of the fracture. It is present in all cases and persists for many weeks after the fracture had been sustained. Very little callus formation occurs during the healing of these fractures. This is probably due to the fracture being subperiosteal. Figures 1 and 2 are x-ray pictures of this type of fracture. The following is a detailed history of a case in point.

CASE I.

L. P., 7 years old, fell several days prior to her visit to the Orthopedic Clinic of Lebanon Hospital. She sustained an injury to her right forearm. The chief complaints were disability and slight pain. *Examination.* There were slight swelling over the dorsum of the right wrist and marked localized "pencil" tenderness over the lower end of the radius, about a half inch above the wrist joint. Ecchymosis, deformity, crepitus and false mobility were absent. Flexion and extension of the wrist were slightly limited. Pronation and supination of the forearm were markedly restricted. *Diagnosis.* A diagnosis of a subperiosteal fracture of the radius was made and subsequent x-ray findings confirmed the diagnosis.

Epiphyseal separation in children has always been reported as a rare occurrence. Pfaundler and Schlossmann have reported seeing two cases in a series of 1,000 fractures. In our series there were 10 cases or 6 2/3 percent of the entire number of fractures. No doubt epiphyseal separations are fairly common. They are readily overlooked, especially if the separation is very slight. In these cases careful study of the x-ray findings will assist one in making a diagnosis. The separation may vary from a slight degree to a marked one. Where there is a slight separation, the symptoms are very mild. Pain and localized tenderness being the most prominent ones. In the severe cases, there are in addition to the above, deformity, crepitus and false mobility. The deformity was so marked in one of our cases, that it resembled the "silver fork" deformity, commonly seen in Colles' fracture in the adult (Case II, Fig. 4). The crepitus as a rule is very soft and does not resemble that usually found in fractures.

Three of these cases were complicated by infraction of the ulna. The symptoms resulting from the infraction were very mild.

Figs. 4 and 5 are x-ray pictures of epiphyseal separation of the radius.

The following is a history in detail of a case in point.

CASE II. FIGS. 4 AND 5.

Edith S. 8 years old, fell from a swing a few days prior to her visit to the Clinic. She sustained an injury to her right forearm. The chief complaints were pain and disability. *Examination.* There was a well marked deformity, resembling somewhat the deformity seen in Colles' fracture in the adult. The hand was displaced upwards, backwards and outwards. Swelling



Fig. 1.—Max W., 7 years old. Subperiosteal fracture of the radius. Front view.



Fig. 2.—Same as Fig. 1. Lateral view.



Fig. 3.—Blanche G., 3 years old. Subperiosteal fracture of the radius. Front view.

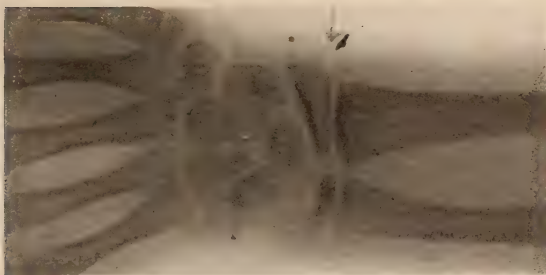


Fig. 4.—Edith S., 8 years old. Separation of the radial epiphysis and infracion of the ulna. Front view.



Fig. 5.—Same as Fig. 4. Side view. Note the displacement of the epiphysis and the hand.

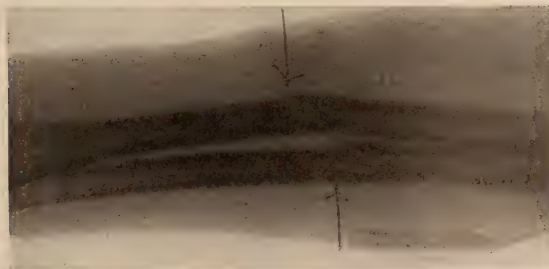


Fig. 6.—Victor K., 9 years old. Fracture of both bones of the forearm, flexion fracture common in childhood.

about the dorsum of the wrist, soft crepitus, false mobility and marked tenderness were also present. There was slight ecchymosis localized to the front of the wrist. A diagnosis of fracture of the lower end of the radius and ulna was made. A subsequent x-ray picture showed a separation of the epiphysis of the radius and an infraction of the lower end of the ulna.

Fractures of the shafts of the bones were mainly of the torsion or bending variety. They varied from a slight bending of the bone to a complete fracture. Figs. 6, 7, 8, 9, and 10 are x-ray pictures of the fractures. False mobility was present in the majority of these cases. Crepitus was elicited in a few. Ecchymosis was seldom present and when it was present was very slight, usually appearing as a slight discoloration in the region of the injury.

Tenderness was present in all of the cases. It was of the "wincing" type so commonly found in bone injuries. It was usually localized to the site of the injury.

Deformity was present in a number of the cases. It was of the angular type, the angle being directed forwards. There was very little difficulty in overcoming the deformity in the majority of cases.

TREATMENT.

The management of fractures in children differs from that in adults. The greater intensity of the healing processes in the former requires a shorter period of immobilization. The tender skin of the infant, the movable cover of fat which envelopes the bones, makes an exact therapy very difficult in infants and children. In our experience we have found plaster of Paris bandages more efficient than splints. The affected parts can be controlled readily and accurately without the danger of pressure sores, the result of applying splints too tightly. We have had many cases referred to us, where twelve hours after application of the splints, extensive ulceration had occurred. Then again, especially in very active infants, there is a tendency for the splints to fall off. A properly applied plaster of Paris bandage will obviate these disagreeable mishaps.

In discussing the treatment of fractures of the forearm, we will take in consideration their location, and will divide them into those of the shaft and those low down.

Where there is a fracture of the shafts of both bones, or of the shaft of the ulna or of the radius alone, the deformity, should one be present, is reduced. A plaster of Paris circular bandage is then applied, extending from the middle of the arm above, to the metacarpophalangeal joints below, leaving the fingers unconfined. The elbow should be held at a right angle and the forearm midway between pronation and supination. The patient should be encouraged to exercise the fingers actively from the very first.



Fig. 7.—L. S., 3 years old. Fracture of both bones.

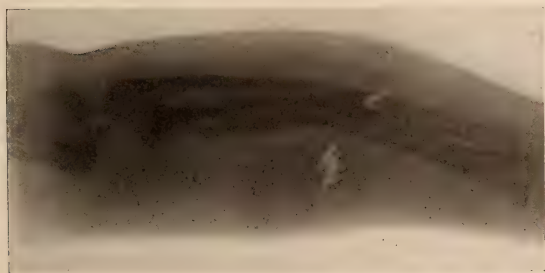


Fig. 8.—T. P., 18 months old. Fracture of both bones of the forearm.



Fig. 9.—A. R., 8 years old. Fracture of both bones, low down.

SUBSEQUENT TREATMENT.

These bandages are retained for about ten days at the end of which time they are divided laterally, so that they can be utilized later as anterior and posterior splints. They are removed and passive movements and massage of the fingers, wrist and elbow instituted. The limb is then replaced in the plaster of Paris bandages. Massage and passive movements should be given every day until movements of the fingers, wrist and elbow are normal and free from pain. This is usually about three weeks after the injury had been sustained.

There are two important points to remember when treating fractures of both bones of the forearm, namely:

1. Ununited fractures of the radius are not uncommon, undoubtedly the result of improper fixation of the elbow, pronation and supination being insufficiently guarded against.



Fig. 10.—Jos. H., 8 years old. Fracture of both bones of the forearm.

2. There is a tendency for the four fractured surfaces to be drawn towards one another and for union to take place with complete loss of pronation and supination. This can be avoided by fixing the forearm so that pronation and supination are impossible. Fusion of the fractured ends can be avoided by preventing all lateral pressure on the bones after proper coaptation. To be successful one must obtain proper reduction and proper immobilization. A pad between the shafts as recommended by many, is unnecessary as it could not separate the bone ends without exerting injurious pressure upon the circulation.

TREATMENT OF FRACTURES LOW DOWN.

In this group are included separation of the epiphysis of the radius, fractures of both bones and fractures of either bone.

After reduction of the deformity, should one be present, a circular

plaster of Paris bandage is applied extending from the elbow above, to the metacarpophalangeal joints below, that is to the knuckles behind and the transverse crease of the palm in front. The fingers should be left unconfined and the patients encouraged to move them. The forearm should be supported in a sling. The subsequent treatment does not differ from that of the shafts of both bones, previously described, hence repetition is unnecessary.

SUMMARY AND CONCLUSIONS.

1. Colles' fracture occurs rarely in infants and children.
2. Where, for any length of time, infants and children refuse to use their forearms, after having sustained an injury, fracture should be suspected.
3. Fractures may be present even though the cardinal signs of fracture, crepitus, false mobility, deformity, are absent. These fractures are usually of the subperiosteal variety. "Pencil" tenderness is the diagnostic feature in these cases.
4. Epiphyseal separation of the radius occurs with fair frequency. This should be looked for in all cases with injured forearms and undoubtedly will be found more often.
5. Plaster of Paris bandages are far more efficient than splints and should be employed in all cases of fracture.
6. Proper immobilization is as important as proper reduction in order to obtain a successful issue.
7. Shorter periods of immobilization, early massage and passive movements should be employed in treating fractures occurring in children.

A PEDIATRIC OUTFIT.

By A. LEVINSON, M. D.,

Instructor in Pediatrics, University of Illinois Medical School; Associate Pediatrician, Sarah Morris Hospital for Children of the Michael Reese Hospital; Attending Pediatrician, West Side Jewish Aid Dispensary.

Is there such a thing as a pediatric outfit? Does a physician in general practice, which necessarily involves a great deal of pediatrics, need any special instruments for the examination of his little patients? There are those who think that not only does the general practitioner need no special pediatric instruments, but that even the pediatrician needs nothing more than a stethoscope and a thermometer to make his outfit complete. To disprove this assertion we should like to present a list of instruments that, if not indispensable, are at least very valuable both to the pediatrician and to the general practitioner whose work takes him among children. Some of the instruments described are for hospital use only, whereas others are for the general use of the physician—simple instruments that can be carried in his grip.

THERMOMETER.

In addition to the ordinary thermometer carried by every physician, the practitioner who works among children should have a special thermometer for rectal use. Besides the fact that the use of the same thermometer for mouth and rectum makes a most unpleasant impression both on the child and the parent, it is wrong to use the one for both purposes. It is most advisable, moreover, to use rectal thermometry on all children under ten years of age. Some pediatricians practise rectal thermometry in children as old as thirteen years of age. Though it may not be necessary to extend the taking of temperature per rectum as far as the thirteenth year, there is more good than harm in the procedure, for it is a fact that rectal temperature is always more accurate than temperature by mouth.

There is but one authority, Gundobin, who is opposed to the use of the rectal thermometer, either in private or hospital practice, on the ground that there is danger of breaking the thermometer in the rectum. On this account Gundobin forbade the use of the rectal thermometer in his own hospital. However, Gundobin's fears in this direction might have been allayed, for there is little danger of such an occurrence if one exercises ordinary caution in introducing the thermometer into the rectum. One has but to heed the ad-

vice given by Jacobi many years ago—to insert the rectal thermometer first downward and then gradually upward, simply following the outline of the rectum and avoiding folds in the mucous membrane—and there is little danger of the thermometer's breaking, in fact much less danger than when it is inserted in the mouth.

Should it even happen that the thermometer does break off the danger is not great. The child should be given some castor oil and the fragment will be pushed out with the stool. No manual interference is necessary.

There are special rectal thermometers on the market, most of them with a protruding bulb at the lower end. The only valuable purpose this serves is to make the rectal thermometer more easily distinguishable from the thermometer intended for use by mouth.

STETHOSCOPE.

The stethoscope used by the pediatrician should be of a kind that will frighten the baby as little as possible. The rubber tubing should be long enough to obviate too close contact with a contagious case. The mouthpiece should be made of hard rubber, and not of steel which is apt to be too cold for the baby and likely to call forth

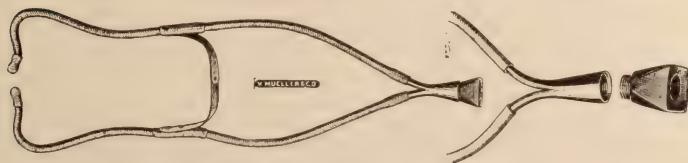


Fig. 1.—Special stethoscope for laryngeal auscultation.

objections from the mother on this score. Several years ago the author described a special stethoscope attachment for laryngeal auscultation, for the purpose of differentiating laryngeal diphtheria from laryngitis (Fig. 1). This is, however, not an absolutely essential instrument since there are so many other ways of reaching a diagnosis.

TONGUE DEPRESSOR.

There are so many diseases of the mouth and throat that occur during infancy and childhood, that it would be criminal to neglect the examination of these organs. Of the many tongue depressors in use the most common and most popular is the flat wooden stick. This tongue depressor has the advantage of being cheap, and therefore makes possible the use of a separate tongue depressor for each child. It has, however, several disadvantages. It becomes soiled and dirty when carried in the pocket. The shape of the wooden stick also interferes somewhat with its usefulness, for, being flat, it does not

depress the tongue of the infant very well and, causing the weight to fall on the tip of the tongue, it makes it possible for the child to contract the tongue and obliterate the view of the pharynx. Several years ago the author devised a tongue depressor which is so constructed that, when it is inserted into the mouth of the child, the child cannot pull the tongue away. The tongue depressor is

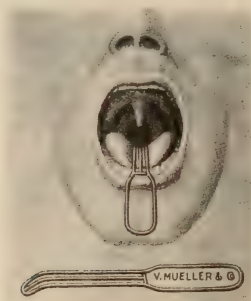


Fig. 2.—Improved tongue depressor.

made of nickel wire with two bars in the center and is curved at the end to allow for depression at the base of the tongue. When put into the child's mouth it gives an entire view of the back of the tongue, the tonsils, the pharynx and the upper part of the larynx. It also makes it possible for Koplik spots to be seen very easily (Fig. 2).

Of course, when no tongue depressor is at hand, a curved teaspoon, will answer the purpose.

CULTURE MEDIA.

No physician who works with children should be without a culture medium. The culture medium furnishes a simple, and at the same time, a most essential diagnostic measure, particularly in diphtheria, and the physician should avail himself of it. There are several ways in which culture media are put up, but the simplest and best is the small box containing Loeffler's serum together with sterile swabs, which is supplied by various health departments. The box is superior to the tube receptacle, for the tube is apt to break, and the cotton plug may easily be pulled out. Besides, cultures dry up much sooner in a tube than in a box.

Stool cultures are useful in research work, but at present their use in practice has not been found to be of great value.

SLIDES.

Next to throat cultures, slides offer a valuable means of diagnosis. Slides are not so valuable for the diagnosis of diphtheria, for a direct smear is not often likely to serve this purpose, but they are extremely important in the diagnosis of infections of mucous membranes, such as conjunctivitis, vaginitis, or infections of other parts of the body. When a slide is taken it is advisable to flame it in order to fix it, and it can then be stained later, if desired. In addition to the above the blood smear helps a great deal in the diagnosis of many diseases.

TEST TUBES.

Test tubes of different sizes should be carried by the pediatrician for the collection of spinal fluid, pus and urine.

APPARATUS FOR WHITE BLOOD COUNT.

The fact that the recognition of leukocytosis serves such a valuable purpose in the differential diagnosis of diseases, especially measles and scarlet, makes a white blood counter a necessity in pediatric practice. Of course if one can have a complete outfit for the counting of both the red and white blood cells, well and good, but when such an outfit is not obtainable, important service can be rendered the pediatrician by the leukocyte chamber. When no blood counter is to be had, a blood smear, as stated above, is of help.

HEAD MIRROR.

Although a head mirror seems to belong particularly in the realm of the ear specialist, no pediatrician can afford to get along without one. The ear is so often the source of obscure fevers and it is so often involved in a great many diseases, that it behooves every pediatrician to carry a head mirror about with him. The head mirror does not have to be very large, nor does it even have to have a band. A small, unencumbered mirror will serve the purpose.

EAR SPECULA.

The examination of the ears also requires the use of small specula. The ear specula on the market are usually too large for a child's ear. In fact the difficulty of procuring small-sized specula seems to discourage the frequency of ear examination in children. Some pediatricians have trained their eyes to such a degree that they can focus on the drum without an ear speculum, simply by pulling the pinna of the ear upward. However, this is not within the power of every physician and wherever possible the physician should therefore make use of the ear speculum. Steel specula are preferable to rubber for this purpose and they are a great deal more durable.

Nasal specula also have their place but since nasal examinations are so infrequently made in children, they can be dispensed with generally. The same thing holds true in regard to laryngeal mirrors. The examination of the larynx or postnasal spaces with a head mirror is so difficult a matter, that only in rare instances should it be attempted. Digital examination answers the purpose of postnasal examination and laryngeal examination should, whenever possible, be referred to the laryngologist.

PARACENTESIS KNIFE.

To complete the outfit necessary for ear work in children a paracentesis knife is quite desirable although paracentesis may be left to the general otologist, the pediatrician only making a diag-



Fig. 3.—Paracentesis knife.

nosis of the ear trouble. A two-piece paracentesis knife is preferable to a long one-piece instrument, as the latter is carried about more easily (Fig. 3).

CURVED HEMOSTAT.

Among the ear, nose and throat instruments that have a special application to pediatrics, one must not fail to mention the curved hemostat, which, though primarily a surgical instrument, is frequently used by the pediatrician for opening retropharyngeal abscesses in infants and children. The curved hemostat makes the best instrument for this purpose and, when one considers the frequency of retropharyngeal abscesses occurring in childhood, it can easily be seen why the curved forceps should be included among pediatric instruments.

STOMACH TUBE.

One of the most important procedures in pediatrics is lavage. Lavage is indicated, not only in cases of poisoning, but is a most necessary measure in all kinds of gastrointestinal disturbances which are of much more frequent occurrence. For washing the stomach in infants a plain French catheter 14-15 will do. All one needs to do is to attach a hard rubber funnel to the catheter, rubber being less readily breakable than glass. Although a catheter and funnel will do very nicely for a stomach tube, a more ideal way is to attach another piece of rubber tubing with a glass "window" piece to the catheter thus enabling the operator to watch the stomach contents during the washing.

DUODENAL CATHETER.

This instrument, which was described by Dr. Alfred Hess for the diagnosis of pyloric stenosis, consists of a long, thin catheter (Nelaton No. 15 French) with a glass bulb at one end (Fig. 4). The tube is first introduced into the stomach and then pushed ahead to the duodenum and the bulb is drawn upon. If the tube is in the

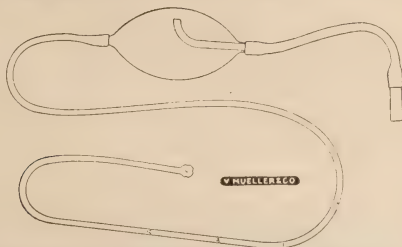


Fig. 4.—Duodenal tube for use in infants, with metal ball and glass bulb, for aspiration and collection of duodenal juice.

duodenum the examiner should be able to draw up bile into the glass bulb. If there is no bile drawn up it is an indication of pyloric stenosis. Although it requires skill to be able to insert the duodenal catheter into the duodenum, it is an art that can be mastered in a short time, and it is one that well repays learning, for it serves as a valuable aid in diagnosis.

NASAL CATHETER.

Some children refuse to take any food and must be fed by a nasal tube, a very thin catheter which is passed through the nostrils into the stomach. The food is poured into the tube through a funnel. Nasal feeding is also useful in coma when children are unable to swallow. The best catheter to use is a 11-12 French.

RECTAL TUBE.

A long, rectal tube is often of great value both in diagnosis and treatment. It may often serve as a means of diagnosing intestinal obstruction, and it is frequently the means of relieving a convulsion by permitting good evacuation of the bowel. A physician should carry one in his satchel.

URETHRAL CATHETER.

While children do not require urethral catheterization as fre-



Fig. 5.—Female urethral catheter.

quently as adults, there are occasions when they do need it, and it would be well for the physician to possess one for such emergencies.

The catheter for male infants should be very thin. For females, a modified steel Eustachian catheter is best (Fig. 5).

SPINAL PUNCTURE NEEDLE.

Spinal puncture is so useful a procedure in the diagnosis and treatment of various conditions that every physician should be prepared to do this operation, if we may call it so, on the spur of the moment. Although each package of anti-meningitis serum usually contains needles, a physician should carry a spinal puncture needle in his grip all the time. The needle for children should be of a diameter a little larger than the puncture needle used for adults, as the child may have a purulent meningitis and the spinal fluid may be so thick that it cannot get through a small opening.

THORACOCENTESIS NEEDLE.

The surest diagnosis of empyema is by thoracocentesis. For this purpose a wide needle is introduced into the pleural cavity at the spot of absolute dullness, which is usually at the lower angle of the scapula. It is safer and better to use a Record syringe at the end of the needle, so as to be able to aspirate the pus. The needle alone, however, will suffice in most cases, the pus oozing out through the needle. Mention may here be made of the fact that trocars have been used for thoracocentesis, but this is open to a great many objections.

SMALL NEEDLES.

Nowadays so many tests are performed by the aid of the small needle that it is necessary to be supplied with a number of them for pediatric work. The intracutaneous tuberculin, the Schick, and the luetin, are all tests which necessitate the use of the small needle. It should be remembered, however, that the point of the needle used should be short, otherwise, besides the difficulty of introducing the needle subcutaneously, the fluid to be injected is apt to run out. The diameter of the needle should also be very small (26-27 gauge).

SYRINGES.

If one can afford to have several syringes of different sizes it is well to do so. However, if one finds it impracticable to have more than one he should choose the tuberculin syringe. This syringe, graduated to one one-hundredth of a cubic centimeter is practically indispensable for quantitative tuberculin tests, for the Schick luetin, and vaccine. This syringe can be used equally well for thoracocentesis or as an ordinary hypodermic syringe.

PIRQUET SCARIFIER.

In the majority of cases there is no need of doing an intracutaneous test for the purpose of determining whether a child has a

tuberculous infection. A cutaneous test will usually do. For this test the Pirquet scarifier is of great assistance. This instrument consists of a platinum stylet and a rather heavy handle. The longer the handle the easier to scarify and the better. Of course, when no Pirquet is to be had, an ordinary needle will do, although the reaction is not as defined as when done according to the Pirquet method.

The Pirquet scarifier has been used and is being used by some physicians for smallpox vaccination. The result is much neater than when the operation is done with a needle.

INTUBATION OUTFIT.

Antitoxin excepted, intubation has saved more thousands of babies' lives from the scourge of diphtheria than any other means. Even

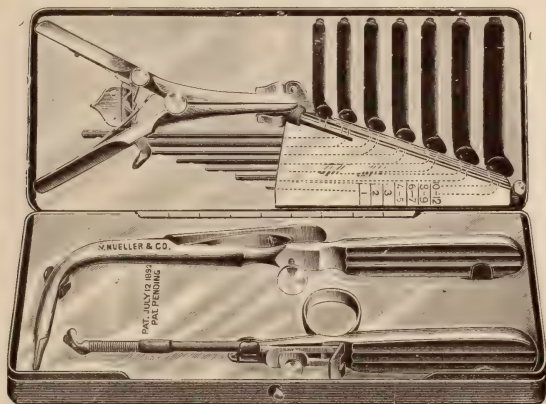


Fig. 6.—O'Dwyer intubation set. a, mouth-gag; b, obturators; c, hard rubber tubes; d, introducer; e, extubator.

to this day when antitoxin is so commonly made use of, intubation steps in every once in a while as a life-saving measure. A physician who expects to practise pediatrics should have an intubation set with him for emergency work. There are two popular outfits on the market: The O'Dwyer (Fig. 6) and the Ferroud (Fig. 7). The O'Dwyer consists of hard rubber tubes lined with metal sheeting, an obturator for each tube, and a separate introducer and extractor. The Ferroud instrument consists of metal tubes with one instrument to be used both for intubation and extubation. Both sets have a mouth gag that is used for keeping the child's mouth open during the operation. Either type of instrument can be used to

good advantage. The hard rubber tubes, it is true, are less liable to produce ulceration of the larynx than the metal ones. However, after being subjected to a great deal of use they are apt to break off. The author witnessed such an occurrence at one time. Generally speaking, however, either rubber or metal may be used with



Fig. 7.—Feroud's intubation set. *a*, mouth-gag; *b*, introducer and extractor in one piece; *c*, gold-plated metal tubes; *d*, scale of years for measuring the sizes of the tubes.

equal success provided proper care is taken to see that the tube is not used too many times and that it is not permitted to stay in the larynx too long.

TRACHEOTOMY TUBE.

When intubation fails, tracheotomy can still be resorted to as a life-saving measure. In some respects, tracheotomy is simpler than intubation and it may be done by any physician. The mortality, however, is much higher in tracheotomy than in intubation, principally because the child is forced to breathe in cold air, which makes him more susceptible to pneumonia. Another factor responsible for the higher mortality of tracheotomy is the fact that it is usually the last resort, after all other measures have failed, the child being thoroughly exhausted by that time. The best tube to use for a case on which a tracheotomy has been performed, is one made of silver or aluminum, not of lead.

SCALES.

For the physician a scale is often as important an article as it is for the grocer. This is particularly true in the case of infant feeding, where a scale tells instantly how much food the infant gets, what the food is doing for him, and whether it is necessary to increase or decrease the amount. A very accurate scale registering in grams is best, but quite expensive. For three or four dollars, however, one may obtain a nursery scale that answers the purpose very well.

A few years ago, Prof. Pirquet devised a "Measuring Band" to be attached to the wall. This measure which is a broad strip; contains figures giving the weight of boys and girls according to their ages, and according to their corresponding height. Unfortunately it is very hard to procure this measure in this country.

MENTALITY SCALE.

The Binet-Simon test has standardized the mentality of children, making it possible to classify a child in a particular group. The greatest fault, of the test, however, lies in the fact that it was made on French children originally, and not enough differentiation for other nationalities was allowed. Yet, in spite of that, it is probably the best mentality test at present available.

SMALL PERCUSSION HAMMER.

Although it is quite possible to get along without this instrument, it is a very useful one to have, for eliciting reflexes in infants. A number of small flexible hammers have been put on the market for



Fig. 8.—Flexible percussion hammer.

use when working with children (Fig. 8). A simple percussion hammer can be made of thick glass tubing bent at a sharp angle and padded with a piece of rubber at one end. This instrument is both cheap and simple.

GALVANIC BATTERY.

Tetany, which is a rather frequent disease in infancy, is best diagnosed by the aid of a galvanic current, the appearance of anodal opening contractions under five milliamperes being a sign of tetany. There are many such instruments on the market, but any simple, portable galvanic battery will answer the purpose.

INCUBATOR.

An incubator is a necessity in a children's hospital. Premature children cannot regulate their body heat like normal children, and they are, therefore, in constant danger of losing too much heat

with great risk to their health. To make it possible for them to maintain their heat, rooms have been set at constant temperatures and incubators of different kinds have been devised for this purpose. Perhaps one of the most practical incubators on the market is the one devised by Dr. Julius Hess of Chicago. Dr. Hess' incubator consists of an electric plate in contact with the floor of a water jacket, especially constructed to carry a maximum capacity



Fig. 9.—Improved incubator.

of 300 watts, and of a rheostat fastened to the standard, with seven contacts.

This incubator has the advantage of being safe in that it gives perfect control of the heat and allows free ventilation of air within the bed, in the general wards of the hospital (Fig. 9).

BRECK FEEDER.

For premature infants who are too weak to take the bottle or the breast, a Breck feeder, which drops the milk into the infant's mouth drop by drop is of great assistance.

URINE COLLECTORS.

Various devices have been made for the collection of urine from infants. On the whole, however, good results may be obtained through the use of a few straps of adhesive attached to a test tube, which in turn is attached to the penis or around the vulva. The urine thus collected is sufficient for examination. Of course, for scientific research a device must be used that will collect every drop of urine.

BLOOD PRESSURE APPARATUS.

The ordinary blood pressure apparatus on the market, which has a small cuff for the child's arm, can be used to advantage for this purpose. Blood pressure determination, however, has until now not proven itself to be of great clinical importance in pediatrics, although it presents a great field for scientific research.

LACTOMETER AND GALACTOMETER.

Years ago, nobody dared to practise pediatrics without an instrument for the determination of fat in milk, especially mother's milk. We have learned, since, that the value of the constituents changes in different portions of the milk, and that these instruments are not very important clinically. Yet if one wants to have a complete pediatric outfit, he should include a lactometer and galactometer.

CROUP KETTLE.

Formerly not only a children's hospital but a "well-trained" private family considered a croup kettle a most necessary asset to be used in a croup emergency. Although the croup kettle may have its place in pediatric practice, it certainly does not occupy the high place assigned to it by older pediatric practitioners. For true croup, or diphtheria, antitoxin offers an effective means of combat, and for false croup, or laryngitis, there are remedies less exhausting than the croup kettle.

TONGUE-TIE CUTTER.

Although many mothers look upon the tongue-tie cutter as a boon, the instrument is not as important as it appears to be. Very few people are tongue-tied and very few need an operation. The cutter,



Fig. 10.—Tongue-tie cutter.

may, however, be used advantageously for lifting the tongue in case of whooping cough, for examining for the presence of an ulcer on the surface of the tongue. It is also useful in cases of edema of the tongue and it may serve as a guide in circumcision (Fig. 10).

SUMMARY.

We may say in closing, that in order to do effective pediatric work a physician must have appropriate instruments to work with. If he cannot have as complete an outfit as the one outlined above, he should try to add as many instruments as possible to his set. Below is an itemized list of the instruments we have described.

- | | |
|-----------------------------|----------------------------------|
| 1. Rectal Thermometer. | 18. Small Needles. |
| 2. Stethoscope. | 19. Syringes. |
| 3. Tongue Depressor. | 20. Pirquet Scarifier. |
| 4. Culture Media. | 21. Intubation Outfit. |
| 5. Slides. | 22. Tracheotomy Tube. |
| 6. Test Tubes. | 23. Scales. |
| 7. White Blood Counter. | 24. Mentality Scale. |
| 8. Head Mirror. | 25. Small Percussion Hammer. |
| 9. Paracentesis Knife. | 26. Galvanic Battery. |
| 10. Curved Hemostat. | 27. Incubator. |
| 11. Stomach Tube. | 28. Breck Feeder. |
| 12. Duodenal Catheter. | 29. Urine Collectors. |
| 13. Nasal Catheter. | 30. Lactometer and Galactometer. |
| 14. Rectal Tube. | 31. Croup Kettle. |
| 15. Urethral Catheter. | 32. Tongue-tie Cutter. |
| 16. Spinal Puncture Needle. | |
| 17. Thoracocentesis Needle. | |

THE CHOICE OF A SUGAR IN INFANT FEEDING.

By THOMAS C. McCLEAVE, M. D., Oakland, Calif.

The problems of the artificial feeding of infants have of late years been subjected to exhaustive scientific investigation, and there are now available fairly exact data relating to the alimentary processes of infancy, whereby, abandoning the purely empirical methods of an earlier period, one is able to direct the feeding of a baby with reasonable regard for its physiological needs.

The computation of the required component food elements in a milk formula is now based upon certain definite principles, and alterations in the nature or amount of these elements are not made haphazard nor by rote, but in response to observations on the symptomatology of the individual child.

Much artificial feeding is, however, under the directions of physicians unskilled in modern methods, or is under no medical supervision whatever, the mother depending only on her own discretion or knowledge, largely derived from popular sources of information. In such circumstances, the much advertised and highly vaunted proprietary food preparations find easy acceptance, seemingly to offer the physician a ready escape from his dilemmas, and affording promise to the mother of a baby like the healthy-appearing, though often overfat, infants pictured in the abundant literature relating to this subject. That conditions appertaining to faulty nutrition constitute much of the morbidity of early life is of course to be expected.

It has been of interest to note, in this connection, the rise in popularity during the last few years of certain preparations consisting of mixtures of maltose and dextrin. Introduced ingenuously "only to the medical profession," the names of some of these have now become household words wherever babies are found, and they have to a considerable extent displaced milk sugar in infant feeding. Possessing undoubted merit for certain purposes, pediatricians have questioned that their general use presents any advantage over that of other sugars, if indeed they may not at times be less desirable.

But three sugars are available for infant feeding, milk sugar (lactose), cane sugar (saccharose), and malt sugar (maltose), and all are alike in that they are dissaccharides and must be split in the intestine by their respective corresponding ferments, lactase, saccharase, and maltase, into monosaccharides before they can be utilized by the organism. All are finally converted into hexoses, and have the same ultimate food value. Lactose splits into galac-

tose and dextrose, saccharose into levulose and dextrose, and maltose into dextrose and dextrose.

Lactose, being the carbohydrate constituent of all milks, would naturally seem the logical sugar to use in infant feeding, and was generally so regarded until recently. During late years, however, its use in the dietary of infants has been subjected to criticism, notably by Finkelstein and Meyer and their followers, who ascribe to it, in conjunction with the salts, the principal role in the production of infantile diarrheas. They believe that diarrhea is due to fermentation of sugar in the intestine; and that the fermentation depends on the concentration of the whey and the relative proportions of casein and sugar in the milk formula. They accordingly treat diarrheal conditions by reducing the sugar and the salts, which is accomplished by precipitating the curd of milk with rennet or pepsin, discarding the whey, and adding to the curd water and buttermilk. The product is known as "Eiweissmilch," and contains, approximately, protein 3 percent, sugar 1.5 percent, and fat 2.5 percent. A quart of "Eiweissmilch" yields only about 320 calories, and after the subsidence of acute symptoms, it is necessary to add, as desired, varying amounts of fat and malt sugar to bring up the caloric value of the mixture, which otherwise is below the nutritional requirements of an infant. Malt sugar is used because it is claimed that, being split into dextrose and dextrose, it is more readily absorbable than the other sugars, and does not leave so great a residue in the intestine to be broken down by further fermentative action into irritating acids, and that its use is therefore not attended by the toxic and febrile effects of the other sugars.

Pure malt sugar for infant feeding is not commercially feasible, and the many preparations on the market are all mixtures of maltose and dextrans, the maltose varying in amount from about 40 to 60 percent. Thus, when these preparations are used, a considerable proportion of the added carbohydrate does not possess the advantages claimed for maltose, as dextrin must be converted to maltose, and this to dextrose before it becomes available.

Moreover, the chief advantage claimed for maltose, its rapid absorption, is, on the contrary, under ordinary conditions, rather a disadvantage, as it has been well demonstrated that the more prolonged presence of lactose in the intestine is an essential factor in the maintenance of the normal intestinal flora, while maltose may itself promote the growth of harmful bacteria. Also, the argument in favor of maltose that the infant has a lower tolerance for lactose than for maltose is not tenable, although the statement is true, because the tolerance of the normal infant for all sugars is equal to any amount which may reasonably be given to it.

The use of cane sugar is open to the same objections as is the use

of malt sugar, and its advantages over lactose are less than those of maltose where a change from lactose is indicated. Many babies, however, take large quantities of cane sugar, as in sweetened condensed milk feeding, over long periods of time without evident harm, as also large quantities of malt sugar in various proprietary foods and dextrin-maltose preparations. Indeed, the excessive fatness of some of these babies seems, to the laity at least, abundant evidence of the value of the foods.

The truth seems to be that many normal babies can take any or all of the sugars apparently equally well, but it is also true that many babies, whose diet contains considerable amounts of cane sugar or malt sugar, ultimately develop nutritional disorders, as rickets and scurvy, and that by far the greatest incidence of such conditions occurs among infants so fed.

There is ample evidence then (not all here given), that lactose is the preferable sugar for normal babies, and that there is no justification for the extensive and indiscriminating use of malt sugar preparations which now prevails.

In respect to sick infants, however, each must be carefully studied and its carbohydrate should be selected to meet known indications.

In a feeble, poorly nourished infant, it may be advantageous to supply it with a maximum of sugar at a minimum expenditure of its energy to avail itself of it, and the use of a malt sugar preparation then would seem most rational, as maltose, splitting into dextrose and dextrose, which requires no further change, is most quickly and easily absorbed. In properly selected cases of this type, therefore, maltose may have very definite value.

Finkelstein's theories have been by no means generally accepted, but there do occur many cases of diarrhea characterized by watery, green, foamy, acid stools in which the lactose and salts of cows' milk are no doubt important etiological factors, and which are best treated by a reduction of these substances by *Eiweissmilch* feeding or some modification thereof, to which maltose is later added in suitable amounts.

On the other hand, diarrheas occur in which butyric acid fermentation is the predominant factor, and as this type of fermentation is most favored by maltose, it should not be used at all, and only small quantities of lactose.

Putrefactive changes in the intestinal contents are promoted by maltose, and inhibited by lactic acid fermentation, and putrefactive diarrheas are consequently an indication for lactose feeding, rather than maltose.

Finally, many diarrheas are due to bacterial infections as yet unclassified, in relation to which the preferable carbohydrate can-

not now be specified, but in which the high casein feeding of Finkelstein would seem to be contraindicated.

Clearly, no single sugar is sufficient for all the contingencies which arise in the artificial feeding of infants, and to adhere to any one to the exclusion of the others is illogical and unscientific. Let us rather learn to select a sugar most suitable for the individual case, giving lactose the preference in normal babies until definite reasons arise for its displacement.

WHAT THE GENERAL PRACTITIONER SHOULD KNOW ABOUT SYPHILIS.

By LOYD THOMPSON, Ph. B., M. D., Hot Springs, Arkansas.
Editor, The American Journal of Syphilis.

INTRODUCTION.

Sir William Osler once said, "Know Syphilis in all its manifestations and relations and all other things clinical will be added unto you."

It is a well known fact that syphilis is much more prevalent in some localities than in others, and it is especially true that certain rural districts are comparatively free from this malady. But in spite of this latter fact, so protean are the manifestations of syphilis, and so far reaching are the results, it is of the utmost importance that all physicians should have a knowledge of its salient features.

Although modern medicine is highly specialized, even to the extent that the syphilologist has taken his place in the ranks of his profession, it is the general practitioner who sees the majority of cases of syphilis, and it is he who treats most of them. It is, then, doubly important that he should understand how to cope with this disease. I shall, therefore, try to point out as briefly as possible the facts which seem to me to be essential.

ETIOLOGY.

It is impossible to treat any disease scientifically without a knowledge of its cause. Since the epoch-making work of Schaudinn in 1905, and the abundant confirmation of it in the past twelve years, it is known that the organism he discovered in a papule from a woman suffering with syphilis is the true and only cause of the disease. This organism which Schaudinn first named *Spirochaeta pallida* and later termed *Treponema pallidum*, is a minute, spiral, cork-screw shaped body, averaging 4 to 14 microns in length and $\frac{1}{4}$ micron in width, although occasionally longer individuals are observed, even up to 40 microns. The body is round in section and not flattened as is the case with some spirochetes. It is actively motile, the motility being of three varieties: (1) A very rapid, smooth spinning motion on its long axis; (2) a forward and backward motion; (3) a lateral, bending motion. Its place in biology has not yet been determined, some thinking it a bacterium, others calling it a protozoon; while still others giving it a place midway between the spiral bacteria and the flagellated protozoa.

It is, however, a cultivable organism, growing anaerobically upon both liquid and solid media, probably best upon ascitic-fluid agar to which has been added at the bottom of the tubes fresh sterile rabbit tissue (testicle, kidney).

Certain of the lower animals can be inoculated, both from syphilitic lesions and from cultures, and the organisms recovered from the lesions produced, thus fulfilling Koch's postulates.

The *spirochaeta pallida* has been found in all organs and tissues of the body, and in all types of lesions. It has even been demonstrated in the urine, in the spermatic fluid of men and in the milk of women.

MODES OF TRANSMISSION.

Since the discovery of the *spirochaeta pallida*, and the proof of its etiological connection with syphilis, the modes of transmission of this disease are better understood. It is practically universally conceded today that there must be a solution of the continuity of epithelium for the spirochete to gain entrance to the body.

There are three methods by which syphilis may be contracted: (1) by direct contact; (2) by intermediate contact, and (3) congenitally.

It goes almost without saying that by far the greatest number of cases of syphilis are contracted by direct contact, and of these, the vast majority are contracted sexually. The next most frequent method of acquiring syphilis by direct contact, is through kissing, while manual and corporeal contact also account for many infections. Numerous physicians and nurses, usually much to their discredit, have acquired syphilis in making examinations and performing operations on syphilitics.

The methods of acquiring syphilis by intermediate contact are almost numberless. Probably the most important of these is due to the use of a common face towel, as it has been shown that the spirochetes can live as long as eleven and one-half hours on a damp towel. Drinking cups and glasses, even the sacred communion cup, pipes, musical instruments, eating utensils, seats of public toilets, all have been known to spread the infection; in fact, there is scarcely any object which comes in contact with lesions of a syphilitic and soon after with the abraded skin or mucous membrane of a non-syphilitic but may carry the deadly germs.

By far the most pitiful method of acquiring syphilis is through heredity. It was formerly taught that syphilis could be transmitted directly to a child from either father or mother. Colles, the famous Irish surgeon, stated that the mother of a syphilitic child could not become infected with the disease, while Profeta taught that a healthy child could not become infected from a syphilitic mother. Both these statements, known respectively as Colles', and Profeta's

laws, have been disproved, and it is conceded today by the majority of the leading syphilologists that syphilis cannot be transmitted directly from the father to the child without the mother first becoming infected. That is, it is perfectly possible for a syphilitic father to beget healthy children.

PATHOLOGY.

There is no tissue or organ in the body which may not be the seat of the *Spirochaeta pallida*, and in all the pathological process is essentially the same. Briefly, this process may be said to consist of the reaction of the tissues to the invading organisms. There is a proliferation of the fixed connective tissue elements, infiltration of round and plasma cells, and the formation of more or less circumscribed granulomata with or without giant cells. While it is true that no tissue is immune to the *Spirochaeta pallida*, there is some evidence to substantiate the theory that there are different strains of organisms which have a greater affinity for certain tissues than for others.

CLINICAL HISTORY.

In the acquired form syphilis begins with a local lesion, or chancre, which occurs at the point of entrance of the organisms into the body; later it becomes systemic and spreads through the lymphatics and blood to the various tissues and organs of the body. In the congenital form of syphilis, the local lesion is not manifest.

Ricord, the great French syphilologist, divided syphilis into three stages; primary, secondary and tertiary, to which Fournier later added a fourth or quaternary stage. The primary stage of Ricord includes the development of the chancre and the adjacent lymphatic adenopathy. In the secondary stage, the disease becomes systemic and certain lesions of the skin and mucous membranes occur, while orchitis, alopecia and iritis may also be observed. The tertiary stage is marked by the invasion of the inner structures of the body, the bones, viscera, joints, etc., while the quaternary stage of Fournier consists of the so-called para- or meta-syphilitic diseases, paresis and tabes dorsalis, which, as will be pointed out later, are now known to be true syphilis of the brain and spinal cord.

Although Ricord's division of the syphilitic manifestations into stages met a long felt want, and is still adhered to by the majority of syphilographers, it cannot today be considered scientific. There is no sharp line of demarcation between stage and stage, for there is a continual and gradual advance of the process from the moment of infection to the terminal manifestations. It is a well known fact that most of the phenomena of syphilis may occur at greatly varying periods from the time of the original infection, and also, that in many cases the so-called "secondaries" do not exist. Further,

in congenital syphilis, and in certain rare cases of accidental infection, no primary lesion occurs. So it seems to me that the only scientific classification of the manifestations of syphilis is an anatomic and symptomatic one, and not one based on chronology. Therefore, in speaking of the eruptions of the skin, which usually occur soon after the chancre, and are generally referred to as early secondaries, I would say that the patient was suffering from *syphilis*, as manifested by a macular, roseolar syphiloderm, and state the region affected.

As stated above, it is practically universally accepted today that there must be a solution of the continuity of the epithelium for the spirochetes to gain entrance into the body. After they have once passed the epithelium there is an incubation period, varying from ten days to three months with an average duration of from three to four weeks, during which the organisms have been multiplying and probably spreading by way of the lymph channels and blood vessels, even after all evidence of the abrasion of the epithelium has disappeared.

At the end of this time the chancre appears at the site of the inoculation. This initial lesion, which usually is papular, takes many forms, is of a varied length of life, and in no way is indicative of the severity of the condition which is to follow. As a rule, there is little or no pain; no evidence of systemic involvement, little discomfort, and the patient generally leads his accustomed life. Soon, however, there is evidence that the spirochetes have left the portal of entry and have invaded the lymphatic system. The glands adjacent to the sore become enlarged and hard, although, as a rule, they are not painful, and rarely suppurate.

Following the appearance of this adenopathy, there is another period of apparent quiescence, known as the second incubation period, which averages in length from six to seven weeks, although it may be shorter or considerably longer. Although, apparently lying dormant, the germs have multiplied and spread over the body by way of the lymph and blood, and presently all doubt of the nature of the disease is eliminated by the appearance of the cutaneous manifestations. While it is a rule that the majority of chancres in individuals who have received no specific medication are followed by skin eruptions, this is not true of all, and a physician who relies for a diagnosis upon the development of the so-called secondaries makes many errors. The syphilodermata, as the skin lesions of syphilis are called, may simulate almost any form of dermatologic disease. At this time also, the lining membranes of the mouth and the throat usually are affected with lesions similar to those of the skin, and with this condition there may be fever, headache and other symptoms of more or less severity.

From this time on, the course of the disease is most protean. The

acute symptoms may disappear, either with or without treatment, and the spirochetes apparently lie dormant for months, or even years. As stated above, there is no tissue or organ which is immune to their attack. The heart and blood vessels are most frequently involved, even in the early course of the disease. The kidneys, liver and spleen are often the seat of infection, causing symptoms of more or less severity. Probably the most important portion of the body to be invaded is the central nervous system, and this infection may occur very early or not until years after the development of the chancre.

Chancre.—The chancre or initial lesion varies greatly in size. It may be so small as to pass unnoticed, or it may be as large as a silver quarter. It is usually more or less circular in outline and generally single, although multiple chancres are occasionally encountered. In most cases, a hard mass or induration develops at the base of the chancre in a few days. This is very variable in size and shape, sometimes being so slight as to be undetected except by the most skillful palpation, and again being hard and nodular and readily recognized by sight. As a rule, uncomplicated chancres heal even without treatment, leaving little or no trace behind; however, a pigmented spot may remain, and sometimes there is a white spot due to loss of tissue, which may persist for years.

The syphilitic chancre is by no means a typical pathologic lesion, although there are a number of fairly constant varieties, the characteristics of which depend more or less upon their location. Of these the most frequent is the eroded chancre, which consists of a rounded or oval spot with a smooth, raw surface. It is not elevated above the surrounding epithelium, and is usually concave in the center, although it may be convex. The next most frequent type of chancre is the so-called indurated papule, which begins as a slight, dark red elevation and may attain the size of 2 cm. or more in diameter. It is dry and hard and the surface remains unbroken. The ulcerating or Hunterian chancre is not infrequently observed, and, as the name implies, the surface is ulcerated, while induration usually is quite marked.

As would be expected, the initial lesion of syphilis occurs most often on the genital organs, and the following are the most frequent sites in the male; the balano-preputial fold, the lining mucous membrane of the prepuce, frenum, skin of penis, glands penis, urinary meatus, scrotum, pre-scrotal angle and urethra.

In the female, the order of frequency of genital chancres is as follows: the labia minora, fourchette, cervix, region of clitoris, vestibule of the vagina, meatus urinarius, upper commissure of the vulva and vagina.

Chancre of the anus and rectum, upper and inner aspects of the thigh and and symphysis pubis, known as perigenital chancres,

occur in both men and women and are, sometimes at least, due to unnatural sexual acts.

Extragenital chancres may occur upon any portion of the body to which the spirochetes gain access. The most common sites are the lips, tonsils, tongue, breasts, eyelids and fingers.

The syphilis chancre is subject to certain complications, the most frequent of which is inflammation; this may be due to the application of caustics, or the invasion of pyogenic organisms. This complication causes marked changes in the appearance of the chancre which, with the adjacent tissues, becomes red and swollen, while pain, which is rare in uncomplicated chancres, may be intense. The complication of syphilitic chancre with soft sore or chancroid, is not infrequent, and must be kept in mind.

Lymphatic Glands.—Not only does the enlargement of the lymphatic glands adjacent to the chancre usually announce the systemic involvement of the individual, but later, in the course of the disease, a general lymphatic adenopathy takes place. The posterior cervicals, occipitals and epitrochlears are for some unexplained reason the ones most frequently affected, and their involvement bears no relation to the cutaneous or other manifestations.

Cutaneous Lesions.—The lesions of the skin are the most striking external manifestation of syphilis, and for this reason the dermatologists have for a long time claimed syphilis as their heritage. But, while the skin lesions are the most striking outward manifestation, they are far from being the most serious, and therefore, syphilis should no more be considered exclusively a dermatological disease than should measles, scarlet fever or any of the exanthemata.

As stated above, the *syphilodermata* or *syphilides* may resemble nearly any known dermatological disease, although they possess certain distinguishing features which are more or less characteristic. The chief of these characteristics are the following:

1. Their dark red, ham, or coppery color.
2. Their usual freedom from pain or pruritus.
3. Their usual development with little or no fever.
4. Their comparatively slow development.
5. Their tendency to polymorphism.
6. Their frequent location on flexor surfaces.
7. Their usually firm consistency.
8. Their tendency to circular arrangement.
9. The frequent development of papules.
10. The usually circular formation and small size of the lesions developing early in the course of the disease.
11. The usually white color and non-adherence of the scales.
12. The greenish or black color, the irregularity, thickness and adherence of the crusts.

13. The tendency of the ulcers to kidney or horseshoe shape.

Scarcely any two syphilologists will agree in all points upon a classification of these lesions. However, the following seems to me to cover the ground thoroughly.

1. Macular.
 - (a) Roseolar.
 - (b) Annular.
 - (c) Pigmentary.
2. Papular.
 - (a) Miliary.
 - (b) Lenticular or flat.
3. Vesicular (rare).
4. Bullous (rare).
5. Pustular.
 - (a) Acuminate (large and small).
 - (b) Flat (large and small).
6. Nodular or tubercular.
7. Gummatous.

The most frequent type of the macular syphiloderm is the roseolar, and it is also the most common of the skin lesions of syphilis. Its time of appearance is usually six or seven weeks after the development of the chancre, but it may appear earlier or much later. The abdomen and chest are earliest and most often involved, but it may spread to nearly every portion of the cutaneous surface. It consists of spots of varying size, the average being about 1 cm. in diameter, which are little, if any, elevated above the surrounding skin. In the beginning, the color is a pale pink, but later it may become a dark red or copper color. As a rule, this eruption persists for several weeks if treatment is withheld but it is very amenable to specific therapy.

The annular macular syphiloderm is rare and, as the name implies, consists of ring shaped lesions not elevated above the surrounding skin. It has been observed as early as two or three months following the chancre and as late as four or five years.

The pigmentary macular syphiloderm is comparatively rare and somewhat resembles vitiligo; usually consists of a pigmented area of a *café au lait* color in which develop white spots of various sizes and shapes. The most frequent site of this lesion is the side and back of the neck, and it usually occurs between the sixth and twelfth month of the disease.

It will be seen from the above classification that the papular syphilodermata consist of two varieties, the miliary and the lenticular or flat. The former consists of acuminate or rounded projections, varying in size from a pin head to that of a French pea. It is usually associated with a hair follicle. This eruption is most frequently found on the face, neck, shoulders, back, arms and thighs.

and usually the separate lesions are closely crowded together with a tendency to form groups, while the intervening skin is normal. At first the miliary papular syphiloderm has a bright red color which later fades to a dark brownish or violaceous red.

The lenticular or flat papular syphiloderm differs but little from the miliary lesion, except in size, which varies from that of a pea to a large bean, or larger. When very large it is termed nummular.

This type of papular lesion occasionally, especially in negroes, shows a tendency to ring formation and it is then termed annular or circinate.

Not infrequently, the lenticular papular syphiloderm exhibits marked desquamation and is then called papulosquamous. This type of lesion is often seen on the soles of the feet and the palms of the hands, when the terms palmar and plantar syphiloderm are applied. When the lenticular papular lesion instead of desquamating presents a more or less moist appearance, the term moist papular syphiloderm is used. The development of this type of lesion is largely dependent upon the location, thus around the anus and genitals, especially in women where more or less warmth and moisture exists, the moist papule is often seen.

All of the papular lesions are, as a rule, of early development; that is, within two or three months after the chancre, but they are often seen much later, especially as a recurrence, even as late as fifteen to twenty years.

The vesicular and bullous syphilodermata are exceedingly rare in the acquired disease; so rare, in fact, that their existence is denied by some. However, a few cases have been observed. The bullous syphiloderm is very frequent in congenital syphilis.

The pustular syphiloderm is not as frequently observed as formerly and usually occurs in individuals of lowered vitality. This type of lesion is most often seen within the first six or eight months following the chancre, but may occur much later.

The acuminate pustular lesion, as its name implies, consists of pointed or rounded pustules which vary in size from a pin head to a pea. As a rule, these lesions are quite abundant and may be spread over almost the entire cutaneous surface.

The small flat pustular syphiloderm is a round or oblong flattened pustular eruption, varying in size from 2 or 3 mm. to 1 cm. in diameter. It usually is superficial but may be deep. The seats of predilection are the hairy parts, the scalp, pubes, chin in men, etc. As a rule, this type of lesion is of rapid development and dries into a thick, dirty yellow or brownish crust.

The large, flat pustular syphiloderm is also seen both as a deep and superficial lesion. The latter differs only in size from the small, flat lesion. Sometimes the crusts form so rapidly that the term pustulo-crustaceous syphiloderm is applied. The deep seated lesion

is, as a rule, a late manifestation of the disease, but is occasionally noted in the early course, in the so-called malignant syphilis. The crust of this lesion is of a brownish-black color with sometimes a greenish tinge. Often the crust formation goes on so rapidly that it presents a laminated or shell-like appearance and is termed *rupia*.

The nodular syphiloderm is usually a late manifestation of the disease, but it may develop as early as the first year. It consists of a firm, circumscribed, more or less elevated lesion, which may involve the whole thickness of the skin, and varies in size from a pea to a good sized hazelnut. The color is reddish brown or copper color. There is no portion of the cutaneous surface but may be attacked by this syphiloderm, but the most frequent locations are the head and face, the back, neck and shoulders, the exterior surfaces of the joints and the buttocks. The coalescence of several nodules may form a circinate or serpiginous lesion which terms have been applied.

The gummatous syphiloderm is usually the latest of the skin lesions. As a rule, it does not occur before the third or fourth year of the disease, but it has been noted within a few months following the chancre, and as late as the thirtieth or fortieth year. It first appears as a hard, firm nodule beneath the skin and gradually increases in size, stretching the skin and changing the color to a dull red. It may grow slowly or rapidly and sometimes attains the size of a walnut, or larger. While at first the lesion is firm and hard, if left untreated, the center breaks down and a deep punched-out ulcer is formed. The lower extremities are most frequently involved, although any portion of the cutaneous surface may be affected.

SYPHILIS OF THE APPENDAGES OF THE SKIN.

The hair and the nails are affected to a greater or lesser extent, in a large number of cases of syphilis. The loss of the hair, or alopecia, is one of the best known symptoms of the disease. The most typical type of syphilitic alopecia is that in which the hair of the head falls out as a general thinning, giving the scalp the so-called moth eaten appearance. Other portions of the body may also be affected, as the eyebrows, pubes, axillae, etc., and complete alopecia may occur, as in one case which I reported. The alopecia of syphilis is usually an early manifestation of the disease, occurring, as a rule, during the first two years.

Syphilitic onychia and paronychia are comparatively rare and need only to be mentioned.

MUCOUS MEMBRANES.

The mucous membranes of the body, particularly those of the mouth, are subject to lesions very similar to those of the skin. These lesions are, as a rule, termed mucous syphilides, but as the

term syphilide is used by many as a designation for the lesions of the skin, it seems desirable to have a term which applies only to the lesions of the mucous membrane. I have, therefore, proposed the term syphilocycoderm (*syphilis*, syphilis; *mycoderm*, mucous membrane. *μύκης*, mucous, *δέρμα*, skin).

The following list comprises the syphilomycodermata, nearly all of them being observed on all of the mucous membranes:

1. Macular.
 - (a) Erythematous.
 - (b) Erosive.
2. Papular.
 - (a) Erosive.
 - (b) Ulcerative.
 - (c) Vegetative.
 - (d) Squamous.
 - (e) Leucoplakia.
3. Gummatous.

All of the above terms are self explanatory, with the exception of leucoplakia and need no further mention than that they occur at about the same period as their homologues of the skin.

Leucoplakia is a condition of the mucous membranes which consists of a grayish or whitish discoloration and more or less thickening. It has been described as homologous to the palmar and plantar syphilodermata.

VISCERAL SYPHILIS.

As stated above, there is no organ or tissue of the body which is immune to this disease, and for this reason the physician should never lose sight of the fact that he may be dealing with syphilis when treating diseased conditions of any organ.

Heart.—This most important organ is very frequently the seat of syphilitic involvement; in fact, in all probability it is practically always invaded by the spirochete in all cases of syphilis, although symptoms of such invasion are not necessarily present. The pericardium is rarely involved, but syphilitic myocarditis and endocarditis are comparatively frequent and the symptoms differ little from those found in such affections of other etiology.

Aorta.—Syphilitic aortitis is quite frequent, the principal symptoms being pain, dyspnea, palpitation and tachycardia, depending in severity upon the amount of involvement. Aneurism of the aorta is most frequently due to syphilis; in fact, it rarely is due to any other cause.

Lungs.—Formerly syphilis of the lungs was considered a rare condition, but with more modern methods of diagnosis, more and more cases are being recognized. The most frequent symptom is cough, which may be mild or severe. The sputum is usually muco-

purulent in character and may be scanty or profuse. It may contain elastic tissue and is sometimes stained with blood. Marked hemoptysis rarely occurs, while night sweats are infrequent.

Stomach.—Gastric syphilis also was formerly considered a rare condition, but during the past two or three years numerous papers have appeared on the subject. The most frequent type of syphilis of the stomach is the ulcerating gumma and the symptoms are very similar to those of other types of gastric ulcer.

Liver.—Syphilis of the liver is of comparatively frequent occurrence and varies a great deal in its manifestations. In the early course of the disease an icterus is very frequently noted and is probably due to the direct action of the organisms on the liver. Acute yellow atrophy due to syphilis is sometimes noted, while syphilitic cirrhosis occurring from three to ten years after infection is not rare. The symptoms of these conditions differ but little, if any, from the same conditions of other etiology. Gummata of the liver are not infrequent and produce symptoms depending upon their size and location.

Testicles.—Syphilis of the testicles occurs in two forms; as a diffuse orchitis and as gummata. The former is of frequent occurrence and is seen as early as two or three months after infection, but is usually much later. It consists of a slow, painless, uniform swelling of the gland which may only be recognized accidentally.

Gummata of the testicles also usually are painless. They vary in size from two or three millimeters to several centimeters.

Kidney.—All types of nephritis with syphilis as the cause, have been described. Early in the course of the disease a mild type of nephritis with small amounts of albumin and a few casts is very often seen. This may become more severe and an acute nephritis develop with all the usual symptoms. Chronic nephritis is less frequent and usually develops from three to ten years after the chancre.

Bones.—Syphilitic periostitis, osteitis and osteomyelitis are among the most frequent affections of the disease and give rise to symptoms depending upon the bones affected and the severity of the process.

Joints.—Arthritis due to syphilis also is of frequent occurrence and no joint of the body is immune to the attack. The condition may be either acute or chronic and depends in severity upon the amount of involvement.

Nervous System.—Of all the syphilitic processes, none is more serious than the involvement of the central nervous system. All portions of the central nervous system may be affected and the various conditions will be described under the following headings:

I. Meninges.

II. Arteries.

III. Brain Substances.

IV. Cord Substance.

The *Meninges* may be, and quite frequently are, involved early in the course of the disease, even as early as two weeks after the appearance of the chancre, but symptoms of such involvement usually are not evident until much later. The symptoms will depend somewhat upon the location of the process. The most constant ones, however, are headache, vertigo, vomiting and psychic disturbances, such as delirium, stupor, etc.

Arteries.—Syphilitic arteritis of the brain may be seen as early as the third month following the chancre, but is usually seen between the third and tenth year. Such involvement may or may not be followed by monoplegia or hemiplegia, but such symptoms as headache, vertigo, insomnia, loss of memory, lack of ambition, irritability, etc., are observed.

Brain Substance.—The brain substance or parenchyma of the brain is affected both by gummata, which are rare, and by the infiltration of the gray matter with spirochetes with the resulting conditions and symptoms known as paresis or general paralysis. The latter condition, which with *tabes dorsalis* was formerly termed meta- or para-syphilitic is now known to be due solely to the organism of syphilis. Paresis is such a broad subject in itself, and is largely a neurological and psychiatric problem, that no attempt will be made at this time to describe its symptomatology.

Cord Substance.—The parenchyma of the spinal cord may also be affected both by gummata and by an infiltration of the spirochetes. The latter involvements results in the symptom-complex known as *tabes dorsalis* or locomotor ataxia. This subject is also a neurological problem and is so broad that it cannot be discussed at this time.

[To be concluded in July issue.]

SYPHILITIC ARTHRITIS—A QUESTION OF DIAGNOSIS.

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In a paper on the subject of joint syphilis, published in the *American Journal of Orthopedic Surgery*, January, 1914, I reported that 10 percent of all cases seen at the Orthopedic Clinic of the Washington University Hospital from January 1, 1912, to February 17, 1913, were joint syphilis; from April 1, 1913, to April 1, 1914, 9 percent of all cases in this clinic (490) were joint syphilis. If we deduct the cases which are obviously not joint infections, we find that 12 percent of the remaining cases were joint syphilis. These statistics are conservative, as they do not include a number of suspicious cases and cases where the patients were not treated long enough to allow a positive diagnosis.

It seems from this that the question of joint syphilis is a more important one than commonly supposed. The most important point in the study of joint syphilis is the diagnosis. The necessity of a correct diagnosis is obvious, as the difference between the treatment of syphilis and other conditions is so radical that the prognosis depends essentially on the correctness of the diagnosis and the resulting treatment.

I shall touch briefly on the pathology and symptoms of joint syphilis. These may be classified as (1) early secondary, (2) secondary, (3) tertiary.

1. *Early Secondary*.—These consist, mainly, in multiple joint pains, which are apparently toxic in origin, and are similar to the arthralgias seen in other infectious diseases.

2. *Secondary*.—In this stage we meet with a simple synovitis. There is no joint destruction.

3. *Tertiary*.—Here we have a simple synovitis, which may be primary or secondary to an adjacent gumma. There may be a synovial or periarticular thickening, which may eventually become gummatous and invade the joint, resulting in destruction of the cartilage and the bone, and, finally, loss of function. Or the process may begin as a gumma of the bone and extend into the joint, causing destruction of the bone and involvement of the surrounding tissue. It will be noticed that these changes are similar to those of tuberculosis. We also meet with bone changes, which are very similar to those of osteoarthritis.

Microscopically, sections show changes characteristic of the gumma, though these may be similar to those of tuberculosis.

The microphotograph shown in Fig. 1 was taken from a section removed from a syphilitic elbow. A diagnosis of tuberculosis was at first made, but later, after a more careful study, the following report was made by the Pathological Department of the Washington University Medical School:

"The tissue in section consists of dense fibrous tissue, showing evidence everywhere of marked chronic inflammation; large collections of lymphoid cells scattered irregularly everywhere, with no special reference to the vessels—not characteristic of syphilis; besides these, there are many mononuclear cells, frequently plasma cells, here and there are a few polynuclear leucocytes, occasionally an eosinophile, though these are rare. The fibrous tissue is edematous in places; in others, dense and hyaline.

"Nearly all the sections show areas of necrosis; these are irregular in size and distribution. The larger of these are more characteristic, and contain a pink staining homogeneous center, which is practically structureless. On higher magnification, however, it becomes apparent that the structure of the tissue is not absolutely lost, for here and there connective tissue cells and small blood vessels can be made out indistinctly, characteristic of the gumma. At the periphery of the area of necrosis, cells are seen arranged in radial manner resembling, structurally, epitheloid cells, seen at the edges of tuberculous areas or lesions. These cells are large, oblong, and have oval vesicular nuclei. Scattered among these are giant cells. As a rule, there is dense infiltration of lymphoid cells about the area of necrosis. The blood vessels are numerous and their walls are slightly thickened. Nerves are also plentiful. Here and there scattered through the sections, especially through the areas of necrosis, are seen small nodules consisting of large polygonal or rectangular cells, with large pale nuclei. These cells have a concentric arrangement, are closely packed together, and are surrounded by a zone of epitheloid cells."

If there are any rules which govern the symptoms of joint syphilis, they must be well proved, for every description of a symptom is qualified by exceptions. Pain, one of the important symptoms, may be very slight or absent, or it may be very severe. It may or may not be worse at night. It may or may not be increased by function. On the whole, however, I do not believe that the pain is proportionate to the severity of the joint involvement. Fever is usually very slight or absent. It may, however, be high and associated with marked pain, so as to closely simulate acute articular rheumatism. The onset may be slow, insidious, or sudden.

In the early secondary stage the joint symptoms are usually polyarticular. In the secondary and tertiary stages they are, as a rule, monoarticular. Frequently, however, several joints may be involved in succession before the disease finally settles in one joint.

This brief outline of the symptoms is based on personal observations and on a careful study of the literature. The only thing it shows, and the point which I wish to emphasize most strongly, is that there is no definite symptom complex, and that the symptoms may simulate almost any joint condition.

The x-ray is a valuable aid in making a diagnosis and in studying the pathological changes which are taking place. Figs. 2 and 3



Fig. 1.—Microphotograph taken from a section removed from a syphilitic elbow.



Fig. 2.—A typical syphilitic synovitis. It will be seen that there is no destruction or sign of bony change.



Fig. 3.—Another case of syphilitic synovitis. Here some bone changes are evident, especially in the patella.



Fig. 4.—Marked atrophy of the joint cartilage, with some slight erosion; also some periosteal irregularity and thickening. The patient made a wonderful functional recovery after neosalvarsan.



Fig. 5.—This case is of interest, as the diagnosis was in doubt for some time and lay between tuberculosis and syphilis. The patient had a suspicious history, gave a positive Wassermann, and improved for awhile immediately after an injection of neosalvarsan. The joint was later excised and was a typical tuberculous joint. The infection was probably a mixed one, tuberculosis and syphilis.



Fig. 6.—Syphilis of the elbow.



Fig. 7.—A case of syphilis. The microphotograph shown in Fig. 1 was made from a specimen removed from this case. The marked periosteal involvement will be noticed and also the bone destruction.

illustrate some of the earlier changes, and are fully explained by the accompanying legend.

At the clinic in one year I have seen syphilitic arthritis simulate almost every form of common joint disease from torticollis to flat-foot. (These cases have been reported in the paper previously referred to.) The important and most common conditions from which it must be differentiated, however, are osteoarthritis, infectious arthritis, and tuberculosis.

The differential diagnosis of syphilitic arthritis is very difficult when based on the symptoms, the physical findings, and the x-ray. Specimens for pathological study are not frequently obtained, and, when they are, the specimen is apt to resemble tuberculosis closely unless very carefully examined, and may be mistaken for it. The distribution of the lesions is of no avail, as every joint in the body may be affected, though the knee seems to be most frequently involved. The symptoms, also, do not help us, for they vary from one extreme to the other. In the x-rays already shown the only characteristic is the periostitis, and even that is often absent or difficult to find. Where there is marked bone destruction, the picture may closely resemble tuberculosis. In many cases the x-ray is absolutely negative.

Some of the more advanced types of syphilitic arthritis are shown in Figs. 4 to 7.

How, then, are we to make a diagnosis of syphilis? I believe that the diagnosis should be made on (1) the history, (2) the physical findings, (3) the Wassermann, (4) the therapeutic test.

1. In all joint cases a history of syphilis should be sought. If the patient does not admit lues, then suspicious signs should be looked for. Some patients deny syphilis intentionally, many others because they honestly do not know that they have had it.

2. Unless an absolutely positive diagnosis of some other joint condition can be made, then syphilis should be suspected. In all cases absence of or slight pain, with functional disability, should be regarded with suspicion.

3. The Wassermann is the most important aid to the diagnosis. I believe that this test should be made in all cases of arthritis. Where this is impossible or inadvisable, it should be used in all cases where a positive diagnosis of some other joint condition cannot be made.

4. A positive Wassermann does not mean, however, that the joint lesion is necessarily syphilis. The diagnosis must be confirmed by the therapeutic test. If the condition is syphilitic, there will be a marked and rapid improvement under antisyphilitic treatment; at times it seems almost like magic. There are also times when the Wassermann is negative, but where one feels that the condition is syphilitic. In these cases the therapeutic test is of great value. I believe, however, that a positive diagnosis of joint syphilis should

not be made unless the Wassermann is positive and is confirmed by the therapeutic test.

Joint syphilis, then, is, I believe, more common than has been supposed. It may simulate almost every form of arthritis, and, if the diagnosis is based on the symptoms and the physical findings, it will often be mistaken for some other joint condition. The x-ray is of value in making a diagnosis, but even it may be misleading. The final diagnosis should be made only on a positive Wassermann, confirmed by the therapeutic test. The importance of a correct diagnosis is obvious, as the difference between the treatment of syphilis and the other joint conditions is so radical that the prognosis depends essentially on the correctness of the diagnosis and the resulting treatment.

Metropolitan Building.

THE CLINICAL VALUE OF THE LUETIN TEST.*

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Since 1911, when Noguchi demonstrated before this society his cultures of the spirochaeta pallida and the cutaneous reaction resulting from the intradermal injection of the emulsion of the killed spirochaetes, reports have come from all over the world corroborating the diagnostic efficiency of the test. They have all agreed in the main with Noguchi's claims, that the reaction occurs only in syphilis, is less common in the first two stages, but occurs in a large percentage of the late cases, often after the serum test is negative. In 1914, Nanu-Muscel, Alexandrescu-Dersca and Friedman¹ of Bucharest compiled the averages of all reports up to that time. These averages gave 33 percent positive reactions in the primary stage, 47 percent in the secondary, 78 percent in the active tertiary, 51 percent in tabes and paresis, and 65 percent in the latent stage. While all investigators agreed on the high percentage of positive reactions in the late stages, there was a good deal of disagreement as to the early cases and the latent cases. Some reports gave many positive reactions in these cases, others few. In our own series² of 344 cases, for instance, we obtained only 20 percent positive reactions in 104 secondary cases, 18 percent positive in 33 latent cases, and none in 7 cases in the primary stage. Others^{3, 4} reported that untreated early and latent cases gave negative results, treated cases positive results. In his introduction of the test, Noguchi mentioned the great effect of treatment upon it. He explained the reaction as due to allergy, or anaphylactic sensitiveness of the skin to the endotoxins of the spirochaeta pallida, similar to that shown for tuberculin by the skins of those harboring foci of tuberculosis. Treatment of syphilis develops this allergy, which by causing a violent reaction, kills off infection at once, and protects the individual in this way.

Recently, however, this explanation and the specific character of the test, have been attacked from two directions. Sherrick⁵ of Michigan University has shown that the administration of potassium iodide in doses of 20 to 30 grains three times a day will sensitize non-syphilitics to the intradermal injection ofluetin, so that a positive reaction occurs in practically all cases. Not only to

*Read before the Chicago Medical Society, February 23, 1917.

luetin, but to solutions of agar agar or starch as well, the skin reacts with a papular or papulo-pustular lesion indistinguishable from the luetin reaction in syphilitics. These findings have been corroborated by several other observers.^{6 7 8} Some time before this discovery, someone conceived the idea of giving iodides to provoke a positive luetin reaction, just as salvarsan is given to bring out a positive Wassermann. This was, as might be expected from Sherrick's observations, very successful, and one of those who formerly made use of this diagnostic refinement ingenuously confesses that he was astonished at the accuracy of his diagnoses, for nearly every case in which he suspected syphilis gave a positive luetin test by this method.

When we consider the extent to which the iodides are used, not only in syphilis, but in many other conditions, it is easily understood how necessary it will be to revise our whole experience with luetin in order to establish its diagnostic reliability. We are forced to regard this test, and perhaps other skin reactions, as complex processes, not adequately explained by the theory of allergy.

Kolmer and Broadwell, in a research upon the spirocheticidal action of the serum of syphilitics, give the results of the luetin reaction in 23 cases of general paresis, in 56 percent of which it was positive, and in 12 cases of other late forms of syphilis, with 75 percent of positives. None of these cases was taking iodides. We are thus justified in hoping that further investigation will show that the test has value. Just how long it is possible for the effect of iodide medication to persist must be determined. Kolmer⁹ reports it still active in one case a month after the medicine had been stopped. It may be that it can last longer in some cases. This adds considerably to the difficulty of the test, for it is often not easy to establish the fact that the patient has not taken iodides for a month or two before a luetin test. As thyroid extract has been shown to provoke a positive reaction, someone suggests the possibility of false positives occurring in cases of hyperthyroidism. This must be investigated.

The hope that the luetin test would be useful in determining a cure of syphilis was long ago given up, for it is not uncommonly negative in the latent cases. If the positive reactions in latent cases are now shown to be due to the iodides, its usefulness will be still more limited. As long, however, as reliable positives are obtained in late cases of syphilis in which the Wassermann reaction is negative, the luetin reaction will continue to be of value in the diagnosis of syphilis. This occurred 27 times in our series of 255 syphilitics, that is, in nearly 20 percent of the late cases, and has been reported by many other observers.

It has been pretty well established that positive luetin reactions do not occur in nonsyphilitics in the absence of iodide medication.

That we escaped getting positives in cases under iodides is no small wonder, for nothing would have been easier than the inclusion of a case under such treatment in our series of 79 non-syphilitics.

Not only must the test be reinvestigated in the light of Sherrick's discovery, but the luetin put upon the market should be standardized in some way, so that we may be assured of an active product. In the trial of the test, we were furnished by Dr. Noguchi with a supply which we diluted as needed. Now we buy it already diluted.

In conclusion we can only express the hope that the luetin reaction will prove of diagnostic value when properly safeguarded. Until it is thoroughly reinvestigated, no one, in my opinion, is justified in basing a diagnosis of syphilis upon this test.

Since this paper was read, Cole and Paryzek have reported a series of positive luetin reactions in nonsyphilitics after the administration of sodium iodide, sodium, potassium and calcium bromides, and potassium nitrate, as well as after potassium iodide. Most of these reactions faded before the fourth day, and therefore would not be confused with the luetin reaction. They do report, however, two delayed luetin reactions in normal individuals.

Stokes reports his very interesting series of reactions produced by the intracutaneous injection of 0.5 to 0.7 percent solution of agar in normal salt solution. They resembled the luetin test very closely, except that they were more inclined to be hemorrhagic and somewhat slower in development. They occurred in from 50 to 70 percent of all cases of syphilis, none of whom were taking potassium iodide, and only one occurred in a nonsyphilitic, in a case of urticaria pigmentosa. He concludes that the luetin reaction is not a specific one, but due to colloidal absorption.

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THE NEGLECT OF GERIATRICS.

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Canstatt, in his memorable work, *Die Krankheiten des Höherem Alters und Ihre Heilung*, published in 1839, the first modern work on diseases of the aged, says, "Medical literature abounds in works on diseases of women and of children. The pathology of special organs and of special classes of diseases has received extraordinary consideration. In contrast to these lovingly fostered fields of medicine there is one field which lies bare and forlorn, though its cultivation promises a most fruitful harvest." [Free translation.] Schwalbe in his *Lehrbuch der Greisenkrankheiten* [Textbook on Senile Diseases], 1909, says, "These words of Canstatt still hold good." Seidel in his monograph on *Diseases of Old Age*, 1890, says, "Mistakes are made daily in the treatment of the aged, and the normal mortality of advanced life is considerably increased as a consequence of the hitherto neglected study of the anatomical and physiological peculiarities of the senile organism."

It is nearly two hundred years since Floyer's *Medicina Gerocomicæ*, the first scientific work on diseases of the aged, appeared. The nineteenth century produced scores of works dealing with senile conditions. Yet today, Geriatrics, as a special field of medicine, lies almost as bare and forlorn as it did in the days of Floyer and Canstatt. Here and there some pioneer has attacked some corner or skimmed over its surface, gathering a rich harvest and proclaiming his finds in medical journals and books, but he has not attracted the attention of the medical profession.

Geriatrics is not an outcast; it is not a discredited branch of medicine. It has simply been neglected; passed by in the rush for branches that are more spectacular as surgery and sero- and organotherapy, or more productive economically, as pediatrics and obstetrics, or more promising of ultimate success, as infectious diseases and diseases of metabolism. Geriatrics promises nothing that is spectacular, little that is economically productive, and its practice must end in the ultimate defeat of the physician's endeavors, for death in old age is inevitable. But Geriatrics does promise the fullest development of the underlying principles of the medical profession, sympathy and science; sympathy to relieve distress wherever we may find it; science, to study life and how to prolong it. To the physician who is imbued with these principles, this appeal to take up the study of geriatrics, should not be made in vain.

Geriatrics is not difficult to master. There are three funda-

mental axioms to be remembered: (1) Senility is a physiological entity like childhood, which must be considered apart from maturity and not as a pathological state of maturity. (2) Disease in senility is a pathological process in normally degenerating tissue and not a pathological process in tissue, such as exists in maturity, complicated by degenerations. (3) The object of treatment of disease in senility is to restore the organism to the state normal in senility and not to the state normal in maturity. Failing to consider these axioms, the physician called to treat an aged patient finds normal degenerations the manifestations of which are more marked than the manifestations of the disease present, and he proceeds to treat the degenerations and restore them to the state of maturity. When he fails and his patient dies he eases his conscience and satisfies the family with the diagnostic placebo, "old age." Here is a typical example. A man, aged 78, was ailing for about a week. He did not complain of any distinct pain but he said he did not feel well and did not want to leave his bed. The physician who had been called in could get no clear history of the present illness, as most of the symptoms had existed for years. There were occasional dull headaches, attacks of vertigo, constipation, dyspnea and wheezing upon slight exertion. Now there were in addition, loss of appetite, and a general feeling of malaise. The physical examination was apparently superficial and showed a coated tongue, intermittent hard pulse, irregular breathing (noted during auscultation), vesicular wheezing, pulmonary and aortic valve sounds exaggerated, mitral sounds weak, abdomen distended with gas, mouth temperature 98° F., blood pressure, 170. The physician's diagnosis was, arteriosclerosis, emphysema and constipation; treatment, iodide of potassium for the arteriosclerosis and a cathartic. The drugs had their expected effect, lower blood pressure and several bowel movements, but these did not improve the patient's condition. The family noticed that he frequently struck his chest as though making efforts to dislodge mucus, that he spoke in his sleep, and that he was becoming weaker. The physician, satisfied that he had brought down the blood pressure, ascribed the progressive weakness to age, and gave an unfavorable prognosis. I saw the patient on the seventh day of his illness, the day before he died. The mouth temperature was 97° F. but the rectal temperature was 100.8° F. The breathing was so shallow that its rapid rate, 28 per minute, was not noticed. There were several areas of percussion dullness and an absence of respiratory sounds over these areas. When the patient was first raised into a sitting position and the stethoscope immediately applied to the back there were fine crackling rales directly under the skin, caused by the opening of the compressed vesicles during the first few inspirations. These rales were heard only during these few inspirations and not later. During the examina-

tion the patient made an attempt to cough and struck his chest in an effort to dislodge mucus, but he was too weak to bring it up. The systolic blood-pressure was now 120 mm., pulse weak, its rate 124 per minute. The patient was semi-comatose and was muttering, and when roused his answers to our questions were not clear. Here was a case of pneumonia which gave no clear symptoms and the early signs of which were masked by the more prominent signs of senile degenerations. The physician overlooked the rectal temperature which, in the aged, is two degrees or more higher than the mouth temperature and in this case would have indicated a serious, acute condition; the localized areas of dulness and the absence of breath sounds in these areas (masked by the vesicular murmur of the overlying emphysematous lung and determined only by immediate auscultation); he also disregarded the patient's efforts to clear the lungs of mucus by striking the chest, and the muttering during sleep, which was probably a low muttering delirium. Owing to the absence of chills, pain and cough and the apparent absence of fever and dyspnea the physician did not think of pneumonia, and considered only the wheezing vesicular murmur, the high blood-pressure and the constipation, all indicative of senile degenerations. In his treatment of the case he succeeded in temporarily relieving the constipation, a symptom of senile atony of the intestines, and lowering the blood pressure, a sign of arteriosclerosis. But reducing the blood pressure does not improve the condition of the arteries. When iodide of potassium is used for this purpose the potash salt diminishes the viscosity of the blood enabling it to flow more freely through the arterioles and capillaries and the iodine acts as a vasodilator probably through its action upon the thyroid. Neither action affects the histological condition of the vessels, yet we find physicians claiming cures in arteriosclerosis because they have secured a lower blood pressure through diminution of the peripheral resistance, lessening the viscosity of the blood and lessening the arterial tension.

The principal sources of error in diagnosis in senile cases are: (1) looking upon senile degenerations as diseases; (2) mistaking senile degenerations for diseases which they resemble; (3) overlooking diseases which are masked by the physical or physiological manifestations of senility; (4) unreliable history, ill-defined symptoms and atypical diseases; (5) misinterpretation of symptoms and, symptom-complexes. In the example cited the first, third and fourth of these sources of error existed. The following case is a good example of the second cause for error. An old man comes to the physician with his own diagnosis: rheumatism. His ankles feel stiff and are painful after walking and when he stands for a long time they become swollen. The physician may find broken down arches and prescribe arch supporters but this condition has

existed so long that the supporters are uncomfortable and they do not relieve the stiffness and swelling of the ankles. If the physician does not know the difference between senile arthrosclerosis and chronic arthritis he will accept the old man's diagnosis, treat him for chronic arthritis and when he fails to effect a cure he will dismiss the case with the usual excuse, "old age."

Unreliable history is a frequent source of error in the diagnosis of senile diseases. Lowered mentality, weakened memory, the tendency to exaggerate, the desire for sympathy, and fear of a painful examination, all affect the history as given by the patient and serve to mislead the physician. In many cases symptoms which might clear up the diagnosis have existed so long that the patient has become accustomed to them and does not mention them. Owing to mental impairment, the patient may not appreciate or recognize abnormal sensations or, owing to peripheral degeneration, no peripheral sensation is produced. Many diseases occurring in old age differ in symptoms and signs from the same diseases in earlier life, and atypical diseases occur frequently.

The following case is a good example of misinterpretation of a symptom-complex. A woman, aged 65, complained of pruritus vulvae. Questioning brought out these additional symptoms: gradual loss of weight and strength, constipation, good appetite, frequent urination, throat always dry, drinks six or seven cups of tea a day. The skin was dry, there was intertrigo under the breasts and in the groins, the face was sallow, tongue red and dry. Here was a perfect history and clinical picture of diabetes, yet the urinalysis failed to show the presence of sugar. Each symptom was then traced to its source. The progressive loss of weight and strength and dryness of the skin is generally found in the aged. Frequent urination due to atony of the sphincter of the bladder occurs frequently in old women and was increased in this case by the large quantity of fluid she took during the day. This also accounted for the large daily output of urine, about 1,500 c.c. The dryness of the throat which occurs sometimes in aged persons and is due to the atrophy of the salivary and mucous glands, was in this case aggravated by the excessive use of tea. Pruritus is a frequent ailment of the aged and is probably due to some degenerative process in the nerve terminals or skin.

Perhaps the most frequent error in diagnosis in senile cases is made in the diagnosis of chronic interstitial nephritis, the diagnosis being based upon the presence of a number of illdefined symptoms taken together as a symptom-complex. This belief is borne out by the frequent reports of the finding of interstitial nephritis upon autopsy in cases which gave no symptoms of the disease during life, and the frequent diagnosis of interstitial nephritis of which no pathological evidence could be found on autopsy. The frequent

reports of interstitial nephritis found at autopsy may be due to the mistake of the pathologist, who does not differentiate between the kidney of interstitial nephritis and the senile contracted kidney, while the mistaken positive diagnosis is almost always due to the finding of albuminuria and the failure to trace each symptom to its source. The urine alone should enable the physician to differentiate between senile contracted kidney and interstitial nephritis, the former a normal senile condition requiring no treatment, and the latter a pathological condition.

The imperative rule in determining the diagnosis of a senile case presenting a number of symptoms is to trace each symptom to its source. There are diseases presenting pathognomonic symptoms, such as arthritis deformans, paralysis agitans, diseases presenting obvious lesions, but even in these cases there often appear symptoms which cannot be connected with the apparent disease and must be traced to their source.

The few instances from actual practice that I have cited show the necessity of a thorough knowledge of the senile organism in health and in disease, and the necessity of applying the cardinal principles of geriatrics in our treatment of senile cases.

For the research worker geriatrics opens a wide field for investigation, with possibilities perhaps greater than in any other field of medicine. What is the underlying cause of ageing? May there not be causes which can be minimized or deferred, thereby prolonging life? Is there any relation between cancer, gout, diabetes, paralysis agitans, and the senile degenerative processes? If not, how then can we account for their much greater frequency in advanced life? How do we explain the comparative immunity to infectious diseases possessed by the aged? It is not difficult to evolve rational guesses and scientific theories, but guesses and theories do not supply the facts necessary to demonstrate their correctness. The solution of these and other problems which the subject presents must lead to far-reaching results in the science of healing and the prolongation of life.

Geriatrics makes demands upon hygiene and preventive medicine, but these demands have been as completely ignored as its demands upon other branches of medical science. The layman knows that the aged person does not need as much food as a young active person yet works on dietetics and nutrition slur over the diet for the aged in a few lines.

What are the best forms of exercise and recreation for the aged? A recent English work on *Old Age; Its Care and Treatment*, gives tables of physical exercises for elderly people, but not one out of a score of old persons whom I put through some of these exercises could keep them up for the allotted period of fifteen or twenty minutes or would repeat them. In youth, if the heart and lungs are

sound, active exercise can be carried on until muscle fatigue makes further activity impossible. In old age active exercise causes palpitation and dyspnea before muscle fatigue sets in, and therefore only such forms of exercise can be indulged in as do not cause palpitation or dyspnea.

Lacking a knowledge of the mentality and the physical capacity of the aged, physicians sometimes recommend irrational recreations with pernicious results. The old man who tries to watch a three-ring circus soon becomes bewildered, and this if continued will result in marked mental confusion with irritability and insomnia, while watching a one-ring circus will amuse and benefit him. The old man falls asleep at the sermon or lecture, not through inattention but because intense mental concentration at the beginning of the sermon or lecture brought on brain fag. It may not be amiss here to remind the physician who reads a lengthy paper at a medical meeting that, when the older men fall asleep toward the end of the paper, it is not through lack of interest. Excessive attention and intense mental concentration caused brain fag and sleep. This can be observed at every medical meeting where the older men discuss a lengthy paper, that they will either take up the early part of the paper, having dozed through the latter part, or they will take up the latter part, having forgotten the earlier part. It should be remembered that brain fag does not set in so rapidly when the train of mental impressions is broken by sensations coming from different sources, as when a lecture is occasionally interrupted by illustrations. This is a matter of common observation.

It is not possible within the scope of a paper to point out all the harm that is done to the aged, in health and in disease, through ignorance of the senile organism and of the fundamental principles involved in the treatment of senile cases. As a result of such ignorance our efforts in their behalf are misdirected, the distress we intend to relieve is aggravated, the lives we might prolong are shortened. Openly we refute the charge, yet in our hearts we must acknowledge the truth that, through our neglect of geriatrics, we are not doing our duty to a class of patients who deserve the best efforts of our hearts and minds.

INSTITUTIONAL TREATMENT OF DISEASE AND SPECIALIZATION.

By FRANCIS M. POTTENGER, A. M., M. D., LL. D., Monrovia, Calif.

Efficiency in therapeutics concerns not only the remedy but the manner in which, and the conditions under which, the remedy is applied.

The advances in therapeutics which have been made during the last few years have not been confined to finding more efficient remedies. Much attention has been given to better application, and the conditions under which the patient is treated are ever receiving more and more attention.

Out of this study has sprung the institutional treatment of disease. It is within the memory of the present generation when institutions were only for the poor and helpless. Their fields of application, too, were limited to very few diseases. Today, however, the sphere of institutional treatment is being extended to almost all severe, serious diseases.

When scientific medicine was young and little was known of the nature of even the most common affections, institutions were considered as necessary only for those whom the municipality and state felt an obligation to look after when ill. The public hospital was almost alone save for a few institutions for the care of the deaf and dumb, blind, imbeciles, epileptics and mental cases. It is impossible, however, for such a big idea as that of institutional treatment to be long confined to narrow limits. The idea that the poor who were treated in institutions received more efficient medical service than the wealthy who were treated in their homes, was gradually grasped by the medical profession and then seized upon by laymen.

One of the greatest factors in advancing the institutional idea has been the wonderful development of surgery. Surgery has demanded certain facilities and conditions which can best be had in permanent institutions. While the surgeon can carry his operative equipment with him from place to place, yet operations can be done so much easier and so much more successfully, and there are so many more operations that can be done safely, in the permanent, suitably equipped operating room, that the operation in the home is now almost unheard of. Surgery could not have advanced as rapidly as it has without the aseptic surroundings and improved facilities of the modern hospital. Thanks to it, no cavity of the body today offers barriers against surgical skill. Operations can be per-

formed in the home, but they are done so much more successfully in the hospital, and the mortality rate and the term of illness has been reduced so substantially, that one no longer doubts the advantages of the hospital as compared with the home in surgical affections.

Careful observation shows that the better surgical results obtained in hospitals are not alone due to the operating equipment and improved surgical technic carried out; but are also due to the fact that the patient is removed from the harmful influences of the home and given the assistance of trained attendants. This then is the true hospital idea, an institution constructed and equipped for the treatment of a special class of cases, manned by special attendants not only trained in the mechanical application of measures, but able to provide the particular helpful atmosphere that is necessary for the patients. This idea is applicable to all diseases.

Efficiency is the watchword of business enterprise. The aim is to produce the best result at lowest cost. This is just as applicable in matters of health as it is in things material. The public, however, has not yet learned this. Health is more valuable than any product from the mine, field, or shop. Each able-bodied individual has a productive value. He represents a certain investment which has been necessary to bring him to his existing state, and, further, he represents potential energy which may be utilized in the production of wealth.

Disease is the foe of efficiency. Morbidity not only decreases efficiency, but causes waste in that it calls for increased outlay. Every time a man is ill, the capital which is sunk in his business is increased by the expenditure required to restore him to health, plus the loss in earning power during his illness, and, at the same time, his future productiveness is in many instances decreased. Economically, then, we have an increased investment with diminished returns. Here then is the economic argument for the efficient treatment of disease which requires not only that the best therapeutic measures be supplied, but that they be applied under conditions which are most favorable. Everyone recognizes the difference in waste between systematized and unsystematized production. Vast fortunes have been made simply through the elimination of waste. The same difference exists between organized, systematized treatment of disease as represented in properly constructed, equipped and conducted institutions, and treatment in poorly managed homes. No great fortune is piled up by any one, but the saving is distributed to many. A few days of idleness saved here, a few weeks and a few months saved there; a greater efficiency here, a life saved there. Such results are not as plainly seen as an accumulation of visible wealth, but they are just as certain and far more remunerative to the public at large.

It must also be understood that institutional treatment in itself does not guarantee efficiency. It may be more wasteful than treatment in the home. Much depends on what might be determined "the soul of the institution," that is, "the atmosphere about it"—the thing which can not be defined, but which impresses one on entering it. When right, it is helpful and inspiring; when wrong, it is harmful and depressing. Too great a proportion of the total concern for institutions is paid to construction and equipment and not enough to creating an optimistic, helpful atmosphere. Brick and mortar make the visible structure, but the "atmosphere" is the real soul created by those who are responsible for its policies and who conduct its operation. This is particularly true of institutions for convalescents and those suffering from chronic disease. It might be said that construction and equipment are most important to acute medical and surgical affections; but, even in these no one will doubt the influence that a cheerful and hopeful atmosphere has in stimulating the body defenses for the serious ordeal of an operation, or for withstanding the harmful influences of acute disease. There is a central nervous system back of every patient suffering from disease, whether surgical or medical, and when this is shielded as much as possible from harmful stimuli, the patient is aided most.

The institutional idea is growing. In the future it will probably develop faster than in the past; and, while not wishing to prophesy, yet I will assert that the institutional treatment of disease will be successful in proportion to the success that it meets in furnishing the helpful atmosphere demanded by those who are ill.

I elsewhere detailed some of the difficulties which are to be overcome in order to make the home treatment of tuberculosis as successful as institutional treatment (*Clinical Tuberculosis*, II, p. 470) and since the principle underlying treatment of all diseases is much the same, I shall quote from that discussion:

"The home treatment of tuberculosis will be successful in direct proportion to the manner in which sanatorium principles are established and carried out. By the term 'sanatorium principles' is meant a carefully planned program of hygienic living, personal hygiene, regulated rest and exercise, food prescribed to suit the needs of the patient, and other measures which are directed toward increasing the patient's vitality, and surrounding the patient with an atmosphere of cheer and hope.

There are two things to bear in mind in treating the patient in the home: first, the arrangement of the room, or whatever accommodations are occupied by the patient in such a manner as to afford the greatest aid to recovery; second, the training of the patient so as to avoid scattering infection and transmitting the disease to others."

and again (p. 472):

"After accommodations have been supplied to the patient in such a way as to afford him the best application of the open air life possible under the circumstances, the next important problem is to furnish him with helpful sur-

roundings. The difficulty here is that the patient is the exception. Home activities are intended for the well. It requires sacrifices not only on the part of the patient, but on the part of other members of the family in order to create the proper atmosphere and to afford the necessary help to the patient. It is the duty of the physician to explain this fully to the friends and members of the family, so that they may cooperate thoroughly toward the one end, that of keeping the patient interested in his treatment, and avoiding distractions, worries, and excitements of various kinds. This is one of the hardest things to accomplish. It is far more difficult than furnishing open air sleeping apartments and it is no less important. The whole family must have confidence in the line of treatment and must be imbued with the necessity of aiding the patient to carry it out, otherwise failure is almost sure to result.

The friends must know that tuberculosis is a chronic disease, which runs an uneven course. They must be prepared for the exacerbations of symptoms which come now and then, and must be able to encourage, rather than discourage, the patient at these times. It is necessary for the physician to tell them what their attitude toward the patient should be, and see that he obtains support and encouragement in carrying out his program. Friends must not be too solicitous. They must not nag. Nagging stirs up rebellion and destroys the spirit of cooperation. The patient must be treated as an intelligent being and must be expected to use judgment. If he does not, it is the physician who should correct him and not the attendants.

I have seen many patients driven almost to distraction by over-anxious relatives and friends. Again, I have seen them throw away their chances of cure by following the advice of relatives and friends who tried to minimize the seriousness of their disease and urged them to do things which would prove harmful. Cooperation of all parties concerned is difficult to obtain, but indispensable to the highest degree of success. Whether this shall be obtained or not, will depend largely upon the physician.

In the preparation of food for the patient care must be exercised. There is too much of a tendency on the part of solicitous mothers, wives, and others, to be too desirous of pleasing the fancies of the patient. The patient's appetite is not the proper guide to the food that he needs and should have. The friends who are around him, unless they are properly trained, have little, if any more, judgment than he; consequently it is the duty of the physician carefully to supervise the diet of the patient."

This is the age of specialization in medicine; but the really successful specialist is the one who realizes that his specialty is a part of internal medicine. It was necessary for specialists to take up the various departments of medicine and develop them, but it does not require a broad vision to see that their principal work is that of the pioneer. They are giving their thought and energy to some special subject that it may be developed and simplified in such a manner as to be utilized by general practitioners of medicine. Those who have added most to their chosen field of specialization, whether it be in the field of the eye, the nose and throat, diseases of the respiratory, circulatory, digestive, or nervous systems, can not help chafing under the restraint of being specialists. They recognize that the symptoms which they are attempting to relieve are as apt to be, and in some instances more apt to be, dependent upon diseases of structures which do not come under their specialty than of

those that do. They further are cognizant of the fact that the structures which are recognized as directly in their sphere of study can not be considered apart from the other structures of the body. Medicine will be successful when it recognizes that the body is a unit, every part of which is affected by every other part, and that the whole is dependent upon the normal action of every part; when it grasps the fact that a disease is of most consequence and is of the greatest interest to the patient as it affects him as a living, thinking, hoping being, and as it interferes with his productiveness.

I have made this seeming digression in order that my opinion of special institutions may be understood. Specialization in medicine requires specialization in institutional treatment, but if this is carried too far it is going to complicate rather than to unify medicine. There are some diseases which for various reasons should be treated apart; but these are few. What we must eventually aim at is efficiency and unity; and this will come when we have fully grasped the most important truth in clinical medicine,—that the pathological process, no matter what it is, must not be considered alone, but in relationship to the entire organism. In other words, clinical medicine must take into consideration the manner in which normal function is disturbed throughout the entire body.

From this it may be seen that the principles of therapy in all diseases must be much the same. Every system of the body must be taken into account. When our specialties have been fully worked out, not only as affecting certain organs and systems, but in their relationship to the important organs and systems which are not the seat of the primary disease, the unity of medicine will be a possibility and the internist be able to render efficient service in all ordinary diseases. When that time comes, it will be possible to successfully treat in general hospitals those diseases which are now being treated in special institutions; and the patient as an individual will profit by the change.

IMMUNITY FROM HAYFEVER AN IMPORTANT ASSET IN NATIONAL MOBILIZATION.*

By WILLIAM SCHEPPEGRELL, A. M., M. D.,

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In the present crisis of our history, when the demand for efficiency is urgent in every department of the Government, the question of hayfever prevention assumes a position of national importance.



Fig. 1.—Common ragweed (*Ambrosia elatior*). Principal cause of autumnal hay fever in the eastern and southern states.

While hayfever is regarded by the uninitiated as a mild malady which causes only transient inconvenience, the hayfever sufferer

*These illustrations are from Britton & Brown's Illustrated Flora of the United States.

knows it to be a grave affliction which saps his energy and lowers his vitality, and whose depressing effect is aggravated by the knowledge of its annual recurrence.

The number of persons suffering from hayfever is far in excess of the usual estimate. A questionnaire issued by the United States Public Health Service in Louisiana demonstrated that approximately one percent (0.99 percent) of the population of this State suffer from hayfever. As this disease is more common in most of



Fig. 2.—Sagebrush (*Artemisia tridentata*). The artemisias are the principal cause of hay fever in the Pacific and Rocky Mountain states.

the other States, it is safe to assume that one percent of the population of the United States suffer from hayfever.

As the strength of our Army will soon be raised to over 600,000 the probability is that about 6,000 of these will suffer from a disease which, from three weeks to about three months or longer, will greatly lower their efficiency, or, owing to asthma and other complications, actually unfit them for duty.

Our investigations for some years have shown that all hayfever

is due to pollen generated by certain plants during their season of fluorescence. As the majority of these plants are worthless weeds, which have already been proscribed for their injury to agriculture, the question of their control and the consequent prevention of hayfever is simply a matter of economic methods.

The predisposing cause of hayfever depends upon the individual



Fig. 3.—Johnson grass (*Andropogon halapensis*). The grasses are the principal cause of spring and summer hay fever.

hypersensitiveness to the proteins contained in the pollen, but the presence of pollen as the actual exciting agent is no longer questioned by any one familiar with the recent investigations on this subject.

As hayfever is, therefore, a distinctly preventable disease, every effort should be made to remove the cause (principally weeds) especially from the neighborhood of hospitals, training camps and barracks. In selecting such sites, moreover, hayfever prevention

should be given careful consideration, and a location selected which is already practically clear of such infection, or one in which the hayfever plants can be economically controlled.

The potential area of hayfever plants is an important consideration in the prevention of hayfever. The chief cause of autumnal hayfever (the principal form) in the Eastern and Southern States¹ is the pollen of the common rag-weed (*Ambrosia elatior*, Fig. 1), whose buoyancy unfortunately is so great (the diameter being 15 microns) that, with winds of from 12 to 30 miles per hour, it will travel five or even more miles in sufficient numbers to produce a reaction in a hayfever subject. This also applies to the wormwoods (*Artemisias*, Fig. 2) which are the chief cause of hayfever in the Pacific and Rocky Mountain States.

Spring hayfever, however, is almost entirely due to the grasses (gramineae, Fig. 3) the larger size of whose pollen grains (30 to 80 microns) reduces their potential area to a mile or less. As a result of this, the enforcement of a suitable grass-weeds ordinance in cities (New Orleans, Pasadena, Calif., New Haven, Conn., Jacksonville, Fla., Charleston, S. C., Philadelphia, Pa., and many others) has already resulted in a marked decrease of spring hayfever. In New Orleans, for instance, the combined efforts of the City Board and the Department of Public Property in enforcing such an ordinance, has resulted in the decrease of spring hayfever to less than fifty percent.

Until legislative action for the control of hayfever weeds has become uniformly effective, cases of hayfever will continue to develop. These should be given the most careful attention both from a prophylactic and therapeutic standpoint. The consideration of this subject has already been published in this Journal.²

It is to be hoped, however, that the recognition of the responsibility of such weeds for hayfever, will result in the enactment of suitable State and municipal legislation, which would soon stamp out this distressing disease. In the meanwhile, it is plainly our duty to reduce the number of cases of hayfever to the minimum, by taking proper measures to control these weeds, especially where they will affect the health and efficiency of our military forces.

¹Hay Fever and Its Prevention. Wm. Scheppegegrell, M. D., United States Public Health Reports, July 21, 1916.

²Notes on the Treatment of Hay Fever. Wm. Scheppegegrell, M. D., Interstate Medical Journal, May, 1917.

THE MODUS OPERANDI OF EPIDEMICS.

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Field investigation of the various communicable diseases in the past year and a half, during which both grippe and poliomyelitis have been prevalent in the epidemic form, has yielded material worthy of close examination. We now have evidence of the simplicity of the mechanism of epidemics and indications for a comparatively simple method of control. By field investigation I refer not only to the examination of all reported or suspected cases, but also to the investigation of family and neighborhood illnesses traced through school absentees, controlling clinical observations by laboratory work.

The pediatrician has special opportunities for aiding in the prevention of the spread of diseases. We know that we save innumerable children from immediate death from diphtheria, only to have them die months or years later either from the secondary effects of that disease, or from some other infection from which they might have recovered had they not previously been disabled.

The prevention of the secondary disabilities resulting from infectious disease furnishes a line of attack against the larger problem, every day more and more urgent, of dealing with the shortening of the life expectancy in and after the middle age period owing to diseases of the cardiovascular and respiratory system.

In the investigations which I am about to relate I availed myself of my previous experience with a rational mode of control of diphtheria¹ and of scarlet fever² during the two previous years. Fundamentally this control depends on two factors. First, the finding of the individual who is the original source of the infection and second, observations of the convalescent to insure that he or she is not released while still an active carrier. In judging this latter point, in each of the two diseases mentioned, great reliance was placed upon the condition of the nasopharyngeal mucous membrane, even to the exclusion and occasionally in contradiction with laboratory results. With regard to family contacts, and especially the person actually in attendance on the patient, it is important to make certain that they do not contract a "missed" infection during the convalescence of the patient. There is otherwise no practical reason for concerning oneself with the patient's surroundings. After an attack of either disease, any acute inflammatory infection, trauma, or operative procedure on the nasopharynx may result in the individual becoming a clinically demonstrable carrier, and this is especially

true where there is lymphoidal hypertrophy of the nasopharynx. Whether the patient has had the fully developed disease or not, the carrier signs are so characteristic as to be self-evident, and, in this diagnosis, the positive laboratory result serves only for confirmation.

Working on this basis during 1914 and the first three-quarters of 1915, the laboratory not only confirmed practically all cases reported or suspected as diphtheria or carriers, but showed that one-third of the cases where the clinical diagnosis was tonsillitis were diphtheria. Here and there occurred the usual laryngitis cases diagnosed as laryngeal diphtheria, which, by examination of the recent family histories as well as by post mortem results, were shown to be laryngitis of bronchopneumonia, complicating or following measles.

During the latter part of 1915 I began to see a new condition which I have described in another paper.³ This was streptococcal laryngitis simulating diphtheria in its clinical manifestation, in the occurrence of familial infections, and in the existence of carriers. Not only laryngeal, but also tonsillar inflammation became increasingly frequent and, later, fatal cases occurred. During 1915, of the 272 cases reported as diphtheria, 200 were confirmed culturally. During 1916, of 164 cases reported or suspected, 61 were clinically diphtheria, the diagnosis was confirmed bacteriologically in 52 cases. In the remainder practically one-half were definitely streptococcal, clinically, culturally, and by demonstration of the carrier. In the remainder the proof was less complete, owing to the absence either of cultural evidence, or of a carrier. The following cases are characteristic:

CASE I.

Girl aged 3, reported as diphtheria, November 21, 1916. The initial culture showed a pure diplo-streptococcus. Onset with high fever and vomiting two days previously. The patient showed a marked bilateral tonsillar swelling, a diffuse injection of the entire fauces, with a filmy exudate over the tonsils, 10,000 units of antitoxin had been given on the day of reporting. A second culture showed the streptococcus only. The patient was one of three children and a cousin of five other children, living downstairs in a two-family house. Of these five cousins, I found one, a boy aged 8, showing a purulent, bloody, unilateral nasal discharge, for which he was said to have been under treatment for the past ten days. A culture showed the same streptococcus, morphologically, as from the one ill. Failing to check the spreading membrane in the patient's throat, 5,000 units were given two days after the first dose. Notwithstanding this, death ensued on November 25th. During the following few days a sister of the carrier developed a similar septic throat, was not treated for diphtheria, and was well in ten days. Cultures during the earlier days as well as at the end of the illness showed a similar streptococcus. With the development of a case in their own family I had no difficulty in having strict attention given to the cure of the carrier, and no further cases occurred in the house or neighborhood.

CASE II.

Young woman aged 21 reported as diphtheria, May 18, 1916. Two weeks previously her husband had had a quinsy sore throat, at the start of which he had been given antitoxin. Later the tonsil had been incised. A culture from the second case showed a pure streptococcus. On reporting to the attending physician, I was told by him that this was the worst case of diphtheria he had had in twenty years and asked me to see the case. With a four days' illness the patient showed a marked orthopnea, bilateral serous nasal discharge, a mouth practically full of a filmy membrane, a tremendous bilateral cervical glandular enlargement, and a subcutaneous edema extending to the umbilicus. While unable to state unqualifiedly that the case was absolutely not diphtheria at the start, the fact that 10,000 units of antitoxin on the second day with a similar amount on the third day had not stayed the process, the acute glandular enlargement, with the history of caring for her husband, as well as the cultural result, was evidence that it was solely streptococcal. Mixed stock streptococcal bacterins were given twice daily. Two days later the patient had practically no subcutaneous edema, the glandular swelling was well down, and, for the first time, she could lie down as well as eat. The husband, who at this time had nothing to show for his infection save an incised tonsillar wound and a torticollis, was developing a large neck abscess which later required external drainage.

We have here an explanation of why diphtheria antitoxin may not cure cases, even when given early and in full dosage. It is not from having been given too late but for dependence on antitoxin alone, as against fully studying the case, when antidiphtheritic treatment given early does not have any appreciable effect. During the period under consideration, no death has been recorded from laryngeal diphtheria, where the Klebs-Loeffler organism has been present, even in cases among young children, where antitoxin was not given during the first few days. Deaths from faucial diphtheria have been recorded, in the usual neglected cases, where medical attention is called upon after a week's illness, or where insufficient amount of antitoxin has permitted the post-diphtheritic paralysis of later convalescence. There is, then, an opportunity of saving the lives of individuals who have an acute infection, which, because of its simulation of the secondarily infected diphtheria throat, leads the physician to believe that he has to do with a neglected case of diphtheria. A study of these cases shows that they are not the text-book type of "grippe-on-diphtheria," although such do occur and, as we have found, show the Klebs-Loeffler bacilli.

During the spring of 1916, especially in June, such throats were frequent both in adults and children. Contact infections from adult to children in families were manifested in all grades from sudden acute hyperemic edematous fauces, to exudative conditions diagnosed as diphtheria. At the time I was not at all impressed by the fact that, during later 1915 and through this period of 1916, there were numerous cases of scarlet fever diagnosed where the patient with the rash had little or no throat or tongue signs and which

were without confirmatory signs of scarlet fever during or at the end of convalescence, and coincidentally, isolated in another room was one to be protected from scarlet fever, with one of these "sore throats," or with "malaria," or "grippe," showing a mild throat. I was impressed with the fact that there was one death from scarlet fever under the age of 15 and 3 deaths over that age, as well as by the fact that I had not the usual 10 percent of reported cases over the age of 15 as in previous years, but instead, an incidence of 23 percent had been recorded. The cases when studied with relation to history and to family infections showed that rather more than one-half were "grippe." In 10 percent of the cases the diagnosis of scarlet fever was recalled within the first week or ten days, the condition at that period as well as the later history showing that they were not true scarlet fevers. I was also impressed with two other facts. First, there were frequently found households where there were present, at the same time, one child with a pneumonia, another with a diffuse herpes of the body, or a true herpes zoster, a third with "malaria" or "grippe," and occasionally a case of arthritis, differing from true articular rheumatism in the absence of multiple joint affections and of hyperemia as well as in subsiding within the week. Second, in such families, or in the families in the same house, there could be found an acute streptococcal nasal carrier. The latter were so frequently found as almost to allay the growing conviction that everyone of them meant not only the present widespread grippe, but a further crop of diphtheria carriers from a possible double infection. The one essential point at the time was that these carriers in the family were frequently the only ones that had not had, and did not develop any clinical manifestation of an infection.

A single fatal case of poliomyelitis in a young child, in mid-June, gave a typical history of the so-called flea-bite encephalitis. From the latter part of May, and especially during mid-June, there was a marked falling off in throat infections, family infections of even milder grades were less frequent, and the nasal carriers among children were less often met with. These factors, combined with the infrequency of suspected diphtheria, or scarlet fever, and a noteworthy absence of streptococci in throat cultures gave assurance that our grippe epidemic was over. Early July was characterized by absence of sunshine, by humidity so high as to be notable, by adults having a return of their headcolds of midwinter, a fact also notable, and by newspaper publicity on infantile paralysis. During the latter half of July and August my entire time was spent in seeing every individual who had a temperature and a headache.

My conclusions based on the experiences extending through the year have been published.⁴ Broadly speaking, the cases could be divided in two classes, the one characterized by the usual paralysis,

more frequently of the lower limbs, in one who had not been sick enough for one to know what was going until the paralysis developed, and who showed no sign of having been through any general infection. The second class showed mainly encephalomeningeal irritation, as frequently unilateral and focal as symmetrical and general. The vasodilatation when general, showed in some instances the morbiliform-scarlatiform-pseudovaricella eruption which was noted in the spring. Practically all showed the same buccopharyngeal congestion with edematous throats, less frequently exudative. There was as well an appreciable general cervical gland enlargement. Those showing the greater irritative signs were relieved by spinal puncture and, in the larger proportion of cases, had nothing to show for their illness after even ten days. Those unrelieved showed a pressure deformity of a grade less than the poliomyelitis of class one. A fair percentage of the cases showed little irritative signs but resembled in all ways infective endocarditis until, at the end of a week, some developed a quickly fatal bulbar paralysis. The immediate family history in an imported case gave a family nasal carrier with a diplostreptococcus as did a number of local cases. Immediately previous history of the family led back to mild abortive cases of "malaria" or the grippe of the late spring, among whom were demonstrable the remains of a mild encephalitis or some muscle weakness. The following cases are very typical of conditions of individuals who were isolated, either voluntarily from fear, or owing to topographical conditions.

The only house on a street on the edge of the town was occupied by two families, consisting of two adults and four children on the first floor, and two adults and two children on the second floor. In mid-August I was asked to see in consultation a young boy in the upstairs apartment. With the signs of a symmetrical meningitis the boy also showed those of a pneumonia of the left lower lobe. Suspecting the latter condition as causative, I asked only for a spinal puncture. This procedure was deferred owing to improvement during the following two days, and death suddenly ensued on the fourth day. Some ten days later, I was asked by another physician to see the younger brother of the patient in the previous case. This case, likewise, was a definite meningitis, but without pneumonia or other localizing lesion. I found on inquiry that during the period of the first boy's illness, the younger boy had been taken care of downstairs. For some two weeks preceding the first boy's illness, a girl living downstairs had been taken care of upstairs, and had been sleeping with the boy, because of illness downstairs. Investigation of the family on the first floor showed that, in mid-July, the girl mentioned had had a bad sore throat, followed by the father having erysipelas, a brother having a "malarial" attack, and, finally, the baby having an unknown something like infantile paralysis, though now at the end of a month there was nothing to show what had been the infection. Permission for a spinal puncture was not given on the second boy. On the strength of the history and the streptococcal culture from the girl, mixed streptococcal bacterins were given but in vain.

Finding in a typical so-called abortive case, a Gram positive diplostreptococcus in a spinal fluid characterized by high cell count and

numerous lymphocytes, and recognizing it as one we had been frequently meeting with in the spring and summer, I followed this organism into the fall.

In one particular instance a throat culture was made from a case diagnosed as diphtheria. The patient was a girl 6 years of age, who had been a resident of the city but two weeks; she had no children in the house to play with, nor had she played with any children, save two girls in a house across the street. One of these two had had a poliomyelitis some three months previously. The other sister I now found recovering from a sore throat, to which trouble she was prone. An organism such as described, was present in cultures from her throat.

A school teacher reported that there was a poliomyelitis case in a tenement house. On investigation we found that a child of 5 years of age had been sent to the hospital as a suspected case. A nasal carrier in the family showed a streptococcus. After five days in the hospital the case was discharged as bronchitis. In ten days' time an older child aged 7 was sent as a case of scarlet fever. At the time of releasing the remainder of the family from isolation some ten days later, the first case was unable to walk and was sent to the dispensary for treatment.

The same held true with reference to typhoid fever, 4 of 60 resident cases of reported typhoids showing the characteristic encephalomeningitic signs as against the true meningismus that we see in true typhoid.

In the last quarter of the year the cycle has been completed in reverse order. Following an adult with meningitis, reported as a poliomyelitis (a nonresident from a locality where the year 1917 has so far been characterized by epidemic cerebrospinal meningitis), was an adult from a poliomyelitis region admitted as a suspected poliomyelitis, but discharged dead as a case of acute Graves disease with bronchopneumonia, and an adult, from a region still reporting poliomyelitis, discharged dead as a case of meningitis and encephalitis. A boy reported as a case of epidemic cerebrospinal meningitis, showed a clear fluid and lack of demonstrable intracellular Gram-negative diplococci, on three successive punctures. In an area covered by two parallel streets two blocks long, there were, in different houses but in boys of the same age, a septic sore throat, and a reported diphtheria where initial and later cultures showed a streptococcus and a streptococcus nasal carrier. The latter patient had a small sister, also a nasal carrier and, across the street, in a girl of the same age, was reported a death from epidemic cerebro-spinal meningitis although the physician after signing the same, called me up and asked if there was any poliomyelitis in that neighborhood, the cases resembling those of the summer.

With the first of 1917 there was a frequency of severe laryngitis in adults. Coincidentally, and following this, there were laryngeal diphtherias in infants especially, where cultures from the infant and the parent, just over an attack, showed a streptococcus. In

others, following an initial laryngitis for which antitoxin was given, the case was reported as measles. Preceding the occurrence of measles, as well as mingled among widespread areas full of measles in older children, were present these suspected or reported cases of diphtheria. In one instance three older children were recovering from chicken pox, one of whom showed a subacute streptococcus throat and tongue with confirmatory cultures. A most satisfactory succession of these cases of laryngitis were intubated by an expert who assured himself by the feel, and myself by his testimony and by cultures, that these cases were purely streptococcal. There were no fatalities among these cases, nor were they given antitoxin save in the minority where, before he had been called, either 3,000 or 5,000 only had been given.

A case of especial interest was that in a family of six children. The next to the youngest, aged 4, was sent to the hospital for intubation at the start of a croup. Of the other members of the family a boy of 8 showed a unilateral bloody-purulent discharge with crusted lesions of the lip, while a boy of 10 showed similar lesions on the lobe of an ear that had been frost-bitten the year previously. Cultures from both showed a streptococcus. The first boy had been treated for the discharge for ten days. One week later their physician asked me to see the family to determine whether three of the children did not have diphtheria. A child aged 2 and a boy aged 14 were free from illness, the other three were in bed, a girl and the boy with the frost-bitten ear having streptococcus throats, while the carrier, without a sore throat, had been put in bed on account of probable nasal diphtheria. Notwithstanding 50,000 units of antitoxin, the hospital patient died on the twelfth day. The remainder of the children recovered.

With measles epidemic in three wards, there could be demonstrated, as I have shown in an article about to be published,⁵ both carriers of convalescence and nasal carriers, as in scarlet fever, as well as nasal carriers who had had measles the previous year or so. With mumps epidemic in a ward on the opposite side of the city, I have had similar experience. In isolated instances, during recovery from measles, children who had had whooping cough the previous year, again had attacks lasting upwards of ten days. In one case an isolated whooping cough was very definitely related to a visiting relative, who had had the disease the year previously, and who now had a purulent streptococcal nasal discharge and all the whooping cough, save the whoop. A single instance of a child recovering from pneumonia and developing a purulent nasal discharge showing pneumococci is worthy of mention.

We were free from meningitis for three months, although a sister city was having numerous deaths from the epidemic form, but a month later we had four reported cases. One, an adult treated for malaria and grippe for one week, had facial paralysis and absence of Kernig, and gave a clear spinal fluid without cells and without demonstrable organisms. A second yielded a cloudy fluid, with

predominant pus cells, and showing a Gram-negative cocco-rod belonging to the influenza group. A third case, in a young child, with a tentative preliminary diagnosis of tuberculosis, gave a clear fluid without cell content or microorganisms. The case was perfectly well within ten days without treatment. The fourth showed the diplococcus meningitidis, and the history showed that the family had moved in the week previous during the time he was ill, from a neighborhood just outside the sister city I have mentioned.

One last story of neighborhood infection may well be related.

On one day there were absent from the kindergarten in one school room, three girls only. One I had had a culture from, where the clinical diagnosis was diphtheria; another I saw at the home, an evident case of pneumonia; the third was just plain grippé, according to the mother and, on examination of the patient, one could not say more. Cultures from the diphtheria case showed on successive days a diplo-streptococcus, and the pneumonia was reported as an epidemic meningitis although no organism was found. The carrier found some four days later was a bloody nasal one, who, with a discharging ear as well, had been having one of his usual bilious attacks or "malaria," which he had had yearly for some three years. A sister aged 2 had a brace on one leg, and inquiry revealed the fact that she had contracted poliomyelitis the previous summer, when the family had temporarily lived in another city, as well as the fact that the boy had had an attack of his "malaria" with discharging ear and bloody nose, just before that though they could give no definite time.

In sum, it is true of all of our communicable diseases, that, during epidemics, there is an activator of each and every one, generally now known under the term "secondary invader." While it is ancient history that the one with tuberculosis, quiescent, incipient, or advanced must be protected against influenza or grippé, lest the process again be either stirred up, or take a fatal issue, according to the stage reached; although it is history that grippé or influenza added on to measles, scarlet fever or diphtheria leads generally to a fatal issue, while the reverse does not hold true, it is not yet appreciated that a streptococcal epidemic may not only simulate, during its rise and fall, every known infection caused by other known microorganisms, giving rise to nasal carriers in exact proportion to the number of those who have a latent focus of infection from a previous epidemic, or even an interim sporadic case, but it also activates some who were previously carriers of those other communicable diseases, like measles, scarlet fever, diphtheria, chicken pox, and mumps.

Under conditions of absence of sunshine and high humidity "cess-pools" of carriers of convalescence, as well as cesspools of self-inoculated nasal carriers form, which explains why infection may be so limited in one area, to be so widespread in another. This is why quarantine is not a procedure for stopping sporadic, let alone epidemic cases, unless the carrier is included. It shows how during a frequency of cases in any communicable disease, the one thing in

common will be the individual who is the storehouse of a previous similar infection, which, roused to activity, leads to cases and carriers.

Lesions in individual cases depend entirely on the weakest part of their makeup, so that a suggested diphtheria in one, a skin rash in another, interchanging with a diagnosis of malaria, typhoid, tuberculosis, pneumonia, meningitis of the winter, and poliomyelitis according to season or other factors, may be part and parcel of a true epidemic gripe. The faster nature dries up with sunshine our nasal carriers, the sooner do we have only sporadic cases and the epidemic is at an end for that period. Not only in the sporadic cases but especially during epidemics, more accurate diagnosis in terms of the epidemiology of the case, less reliance on what the clinical picture seems to be, with more reliance on the laboratory results when they are positive and less insistence on the clinical presumptive diagnosis, will definitely save lives in the future that have in the past been sacrificed, with the report for example "diphtheria-antitoxin was given, but the patient did not respond, even to large doses."

The prevention of epidemics then lies in the prevention of more than sporadic cases which are either reported or are found. If a reported case, our measures are to find the original source and any contact who has been infected, who thus becomes a "found" case. True prevention goes further. By systematic continuous inspection of our human storehouses of previous infections, not of the slums only, the eye alone can localize carriers, while the previous history, with the laboratory aid, will confirm the diagnosis. The observation of the convalescent ill that they are not carriers, and follow-up observation of them at such future times, when conditions may predispose to their again becoming carriers are basic essentials. The pediatrician, more than even the nose and throat specialist, is the right bower to such true prevention.

In the way that epidemics rise and fall lies the secret of their prevention. Further therein lies the solution of reducing infant mortality, as well as that for each and every decade, as well as practical public health education taught in terms of action and demonstrated results, such as to be understood by all persons under all conditions.

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DIAGNOSTIC AND THERAPEUTIC NOTES.

SALVARSAN OR NEOSALVARSAN?—The relative value of the various organic preparations of arsenic at present on the market is by no means firmly established. In the *British Medical Journal* of May 5th Lieutenant-Colonel L. W. Harrison and his coadjutors at the Rochester Row Military Hospital, Major C. F. White and Mr. C. H. Mills, emphasize the obvious difficulties which seriously limit the intravenous administration of these preparations, and the great advantage of the hypodermic method if rendered painless and proved to be as effective as the other. After investigating the Wassermann reaction in a series of more than 100 cases treated by means of the various preparations, some administered intravenously, others hypodermically, they conclude: (1) The intramuscular or subcutaneous injection of neosalvarsan, novarsenobenzol, or novarsenobillon is superior in immediate therapeutic effect to that of the intravenous injection of salvarsan, kharsivan, arsenobenzol, or arsenobillon; (2) spirochetes disappear from syphilitic lesions just as rapidly after the first intramuscular as after the first intravenous injection, and the Wassermann reaction is more quickly influenced; (3) solution of the dose of neosalvarsan in 1 c.c. of 4 per cent. stovaine and emulsion in creol-camp cream eliminates discomfort sufficiently to make the intramuscular injection of neosalvarsan practicable for routine use. This result, if confirmed, will much simplify the work of the venereal treatment centers as well as that of the practitioner called on to administer organic arsenic.

ROUTINE TREATMENT OF SYPHILIS AT THE HOPITAL BROCA, PARIS.—Military needs require a short, intensive treatment of syphilis for the soldier in order to send him back as soon as possible to his place at the front. In the Paris medical of May 5th, Dr. Hudelo, physician to the Hôpital Broca, describes the routine treatment, lasting 40 days, adopted in the hospital since the outbreak of the war. Nine injections of 0.3-0.9 gm. of novarsenobenzol (4-5 gm. in all) are given at intervals of five days interspersed with 20 injections each of 0.01 gm. mercuric cyanide. In every case the patient left the hospital with a negative Wassermann reaction. On his discharge-sheet is written an instruction to receive further mercurial treatment, by pill or injection, after an interval of not more than two months. Dr. Hudelo writes:

"We hope, by this association of arsenic and mercury, that the spirochetes put out of action but not killed by the arsenobenzol, which disappears from the system in 48 hours, and still maintaining a stand in some corners of the organism, will succumb completely to the spirocheticidal action of the mercury. We note with pleasure that a method identical with that here suggested has been adopted in military practice, amongst others, by Favre and Longin, Pautrier, Goubeau, Pasteau and Mallein, Ravaut, and Thibierge."—The Lancet, May 19, 1917.

MISCELLANEOUS

ENLIGHTENED LEGISLATION IN OHIO.

The Eighty-second General Assembly of Ohio gave serious consideration to public health and its various ramifications. The constructive legislation enacted indicates a progressive interest in "causes" and "prevention" and a strong tendency to question the effectiveness of existing public health machinery, as well as a willingness to correct the defects. The assembly was reasonably liberal in its conception of the state's public health responsibilities and in making appropriations for existing and new activities of the institutions and departments maintained by the state. Team-work on the part of Governor Cox and the legislature was an important factor in bringing about results.

Numerous attempts were made to secure new legislation which would break down the educational standards required of those who seek to treat the sick. The Medical Practice Act, intended at least as a measure of protection to the public health, was the basis of bitter contention. Non-medical healers, pressing the claim that the State Medical Board represents the medical profession and with the aid of the police power of the State, administers this Law in the interests of the medical profession, sought to obtain special license privileges. It was apparent that the legislature was unfavorably impressed with the "commercial aspects" of the Medical Practice Act. It clearly regarded the numerous attempts to secure medical license on the basis of ridiculously low educational standards, as not conducive to best interests of the sick, and merely as further extensions of the undesirable features of the act. Every attempt to lower educational standards failed. If the sentiment expressed in the legislature represented the sentiment of the state at large, the time has arrived for Ohio to consider carefully some other plan for the regulation and control of those who treat the sick. And any such plan must be clearly and solely in the interests of the public.

The new plan of organization of the state public health machinery as enacted is of tremendous importance to Ohio and full of suggestion to other states. The present state board of health was legislated out of office and on July 1, 1917, will be replaced by a state department of health similar to the New York State plan. The control of the public health work of the state is lodged in a Public Health Council of four members and a State Health Commissioner with broad executive powers. The Council has a legislative and advising authority only. The Legislature recognized it as essential that the Commissioner should be a high grade official and, accordingly, provided for a five-year appointment with a salary of \$5,000.00. The only qualification specified in the Act is that he shall be a physician skilled in sanitary science. Ohio now expects an efficient public health service.

The subject of State health insurance was given much consideration, and legislation of far-reaching importance enacted. Instead of attempting to unload upon the State a "model" scheme of sickness insurance, not based upon a thorough knowledge of Ohio conditions, legislation was enacted authorizing the appointment by Governor Cox of a Commission to study the subject in its broadest aspects. \$25,000 was appropriated for the work. The importance of

this survey will be apparent to all public health workers and especially to hospital officials as outlined in the following terms:

"It shall be the duty of such commission to make an inquiry into the subject of sickness, and the causes thereof; the loss to individuals and to the public thereby; the adequacy of the present methods of treatment and care of such sickness and of meeting the losses caused by such sickness by existing insurance companies or associations, or otherwise; and the influence of working conditions upon the health of employed persons and methods for the prevention of such sickness.

"It shall also be the duty of such commission to make an inquiry into the subject of old age in its relation to industry and of the adequacy of existing methods of caring for aged workers."

Important changes were made in the State Laws affecting public control of tuberculosis. All reference to "pulmonary" tuberculosis was eliminated and in the future public tuberculosis hospitals will be authorized to admit all cases of tuberculosis—glandular, bone and otherwise. Emphasizing "prevention" the new Law extends permission to County Commissioners to establish one or more free tuberculosis dispensaries in each County. This is the next logical step in the Ohio campaign against tuberculosis and will reinforce the work of the various tuberculosis hospitals and public health nurses.

In justice to the injured workmen as well as to hospitals and doctors of the State, the Legislature amended the Workmen's Compensation Act by providing additional compensation for hospital, medical and nursing service. In the original Law the amount of compensation for such service was limited to \$200.00. This limitation necessitated much "charity" work for the State on the part of both hospital and physician. The amendment provides that in unusual cases additional amounts may be paid at the discretion of the Commission for necessary medical, nursing and hospital service. While reliable figures show that the number of hospital cases requiring additional compensation does not exceed one in a thousand, the amendment removes an injustice of long standing and makes Ohio's Compensation Act the best in the country from the standpoint of medical practice and hospital service.

A constructive program for institutional care of the feeble minded was put through. \$250,000 was appropriated for the building of five cottages in 1917, accommodating 300 patients, and six cottages in 1918, accommodating 350 patients, at the Institution for the Feeble Minded, as well as \$25,000 for a tuberculosis hospital at the same Institution.

Appropriations were also made for five new cottages, accommodating 300 patients, to be built at the Hospital for Epileptics.

\$350,000 was granted to the Ohio Penitentiary Commission for additions and improvements at the new Prison Farm at London.

\$100,000 was appropriated for the building and equipment of an Administration Building to be used by the Bureau of Juvenile Research. This Bureau, which is one Department of the Board of Administration, will make use of this new plant, which may be properly called a laboratory, in examining all juvenile delinquents committed to the custody of the Board. These examinations are to determine what physical and mental defects, what hereditary and environmental influences have effected each child, to the end that he may be permanently restrained or properly trained for citizenship.

Cleveland, O., April 13, 1917.

HOWELL WRIGHT.

BOOK REVIEWS.

MILITARY SURGERY. By Dunlap Pearce Penhallow, S. B., M. D., (Harv.), Chief Surgeon American Women's War Hospital, Paignton, England; Captain Medical Corps Massachusetts National Guard, etc. With introduction by Sir Alfred Keogh, K. C. B., Director-General Army Medical Service. Original drawings by the author. New York: Oxford University Press. 1916. Price, \$5.

During the past two and a half years we have had occasion in the book review department to comment on volumes of war surgery at almost stated intervals. We have already noted the striking similarity in all these volumes, a fact that would very naturally be presupposed. This volume by Penhallow fits in with what we have said about the previous volumes on war surgery, but it is of especial interest to us for the reason that it is the product of an American working in the war zone. Our interest is further stimulated by the fact that those subjects which were not well understood in the earlier part of the war are more adequately treated in this than in all previous treatises. We refer particularly to shell shock, trench foot, gas poisoning, and the influence of the hypochlorous acid and hypertonic salt solutions in the treatment of wound infections. Not a little interest is furnished by the citation of case histories bearing on various types of injuries.

THE BREAST—ITS ANOMALIES, ITS DISEASES, AND THEIR TREATMENT. By John B. Deaver, M. D., LL. D., Sc. D., Professor of the Practice of Surgery, University of Pennsylvania, etc., and Joseph McFarland, M. D., Sc. D., Professor of Pathology and Bacteriology in the Medical Department of the University of Pennsylvania, etc., assisted by J. Leon Herman, B. S., M. D., Assistant Surgeon to the Methodist Hospital of Philadelphia, etc. With 8 colored plates and 277 illustrations in text. Philadelphia: P. Blakiston's Son & Co. 1917. Price, \$9.

No other book that has come to the review table within the past year or two has emphasized the incalculable value of monographic literature as forcibly as this treatise by Deaver and McFarland. Diseases of the breast are more limitedly surgico-pathological in their nature than are those of any other organ: the fact that surgeon and pathologist teamed their efforts on this subject is, therefore, in itself unqualified evidence of crystallized wisdom. Diseases of the breast, furthermore, have been very extensively expounded in the current journal literature of the past decade, thus making the present time most opportune for sifting, selecting, and coordinating the scattered data. This critical survey has been made most admirably by the authors, who have rounded up all the valuable data that have been published on the subject of diseases of the breast.

There are in all twelve chapters, which discuss, in order, The Evolution and Involution of the Breast, Surgical Anatomy of the Breast, Congenital Anomalies of the Breast, Acquired Anomalies of the Breast, Traumatic Injuries of the Breast, Infectious Diseases of the Breast, Cyst and Cystic Diseases of the Breast, General Pathology of Tumors, Non-Indigenous Tumors of the Breast, Sarcoma and Fibro Epithelial Tumors, Carcinoma of the Breast, Non-Operative Treatment of Tumors of the Breast, Diseases of the Nipple and Areola.

No surer evidence of the thoroughness of the work is necessary than the twenty-five pages devoted to Cystic Disease of the Breast. Every significant theory dealing with chronic cystic mastitis is stated in full, the pathology of this little understood entity is lucidly presented, and the basis for setting

surgical indications is worked out on rational principles. Similarly the moot subject of Paget's disease is summarized in full, with accompanying personal critique of valuable sort.

It is somewhat doubtful whether a discussion of the general pathology of tumors is in place in a volume that ought to presuppose the knowledge of this subject. The tumor discussion is so well done, in such short compass, however, that one instinctively inclines to vote for it.

The chapters devoted to non-operative and operative treatment are excellent examples of clear expositions. Here again is emphasized the value of a monograph of the right sort. Should one desire to look up the various operative procedures, he need only thumb the pages of this book instead of wading through the files of various sets of current journals.

The volume is expensive—it almost seems too expensive, and yet the substance is there as warrant for the price.

TEXT BOOK OF SURGICAL OPERATIONS. Illustrated by Clinical Observations. For Physicians and Students. By Prof. Fedor Krause, Privy Medical Councillor, Directing Physician Augusta Hospital, Berlin, in Association with Emil Heymann, M. D., Chief Physician, Augusta Hospital. Translated into English and edited for American readers by Albert Ehrenfried, A. B., M. D., F. A. C. S., First Assistant Visiting Surgeon, Boston City Hospital, etc. In six volumes. Volume II. With 373 illustrations in two or more colors. New York: Rebman Company. 1917. Price, \$7.

This is the second volume of a series of six in contemplation, and is devoted to the surgery of the jaws, pharynx, salivary glands, facial and cervical nerves, general surgery of the brain, epilepsy, brain tumors, brain abscess, meningitis, and plastic operations on the skull.

The fact that the original German work appeared about three years ago, and has advanced no further than the second volume up to the present time, is only one of the minor pieces of the war. The general scope, the detailed descriptions, and the selective critique of the authors lend a classical tone to the work and make it indispensable in the library. Dr. Ehrenfried has made an admirable translation, and the publishers have reproduced the original illustrations most excellently.

TRAUMATIC SURGERY. By John J. Moorhead, B. S., M. D., F. A. C. S., Adjunct Professor of Surgery New York Post-Graduate Medical School and Hospital; Visiting Surgeon Harlem Hospital, etc. With 522 original illustrations. Philadelphia: W. B. Saunders Company. 1917. Cloth, \$6.50; half morocco, \$8.

This large volume of nearly 800 pages scarcely justifies itself. It fails not so much because the subject matter is inadequately presented as for the reason that the self-same subject matter has been presented repeatedly before in adequate fashion. Furthermore, it is difficult to find in the book any data that is either new or directly the result of Dr. Moorhead's own rich experience.

There are, in all, twenty-three chapters devoted to wounds, contusions, shock, injuries of tendons and joints, dislocations, fractures, diseases of bone, deformities of hands and feet, foreign bodies, injuries of the head, spine, chest, abdomen, nerves, blood vessels and lymph vessels, burns, heat stroke, frost bite, injuries due to electricity, caisson disease, illuminating gas poisoning, injuries due to submersion, suffocation and smoke inhalation, injuries in relation to abortion, appendicitis and visceral prolapse, traumatic neuroses, eye and ear tests and standards, x-ray burns, medico-legal principles.

The final chapter on medico-legal principles is particularly well done, and makes the book one of particular value to those men who manage or direct the medical affairs of large industrial corporations.

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EDITORIAL.

THE POISONED CUP.

The more we chase the elusive infective agent, the more we find of him who elect domicile and have their favorite dugouts in the fauces and nasopharynx.

The epidemiologic fact has so nearly become a truism that it should scarcely be necessary to emphasize the importance of the drinking cup as a possible source of infection. Against this danger two measures of precaution have been adopted—the rising or jet fountain and the individual one-time cup.

With regard to the bubbling fountain, it has been shown that, in the continuous running variety, eddies may be formed which will suck in infected secretions from the mouth of a drinker. By inspection of the intermittent form, where the drinker turns on the water by a tap or lever, it is easy to satisfy oneself of the ease with which he may receive matter from the mouth or lips of a predecessor. The best way of meeting these difficulties is to have an inaccessible spout from which an obliquely rising jet can be thrown. This is unobjectionable, except for its inconvenience, as long as the spout is really inaccessible. If, however, it can be reached, it will inevitably be fouled owing to the habit of drinkers, and especially children, of taking the end of such spouts or faucets in their mouths.

These jet fountains are available only in certain situations, and there are others—as, for example, in railroad cars—where some form of individual drinking cup is the only satisfactory solution.

When one considers the classes of persons who frequent saloons, one recognizes how many of them are afflicted with diseases peculiarly liable to be transmitted by drinking vessels. It should be made compulsory for only individual drinking cups to be used in

such places and everywhere where beverages are sold. The same rule should be enforced in schools.

We are all, for our sins, acquainted with the envelope form of paper drinking vessel furnished by the Pullman Company. We should prefer something in the shape of a cup, and such a shape becomes an absolute necessity where the water or other beverage is not drunk off immediately on presentation.

Most of the cups at present in use are paraffined. It must have struck many that such cups can easily be used again. Indeed, it is with a feeling of regret for the destruction of so elegant a thing that one throws these vessels into the waste. Now, the reuse of one of these cups would defeat the whole object of the individual cup supply. Indeed, the danger would probably be more insidious than in the case of the general glass, because confidence would be greater, precautions less, and soiling not so visible. It is understood that the temptation to return these cups into circulation has proved too strong for some parties.

As hygienists we should make a demand for an individual cup service, with the condition that the cup, while sufficiently impervious to water to satisfy the requirements of the first user, should nevertheless be rendered by use unserviceable for a second occasion.

THE PREVENTION OF PEDICULOSIS.

Of the many horrors of war, not a few who have experienced them place the louse among the worst, and, in addition to the exquisite discomfort that results from this vermin, it is known to be a carrier of typhus infection. Elaborate are the arrangements for delousing the soldiers and their clothing, and many and complicated are the methods that have been suggested to prevent or to minimize the development of these parasites. Among the simplest of the preventive measures is one described in the *British Medical Journal* of May 5 last by Captain Gunn. Undergarments are made of butter muslin (we are given to understand that in the United States this material is known as buttercloth and is one of the varieties of surgical gauze). The material is so cheap that undervests cost only eight cents, and therefore can be thrown away instead of being washed. The made garment is dipped in a solution of sulphur and naphthalene (1 percent of each in gasoline or in benzole), and then allowed to dry. The smell is said not to be unpleasant. One may be allowed to guess that the criterion adopted is a trench standard of unpleasant smells. The method seems to be efficacious in the prevention not only of pediculosis, but also of scabies. It is not clear why ordinary underclothing, after washing and drying, should not be treated in the manner indicated.

RENDER UNTO CAESAR—AND TO THE DEVIL—THEIR DUES.

In the June issue of the *INTERSTATE* an attempt was made to straighten out the legal tangle which had resulted from the campaign against the Salvarsan patent.

There is, however, another and perhaps more important aspect of this agitation. It is abundantly clear that behind the cover of the Salvarsan case certain cliques in our profession are stalking much larger game. While our ineradicable tendency to neglect general principles is being exploited in order to attack this particular right, an effort is being made in some quarters to create an agitation against all proprietary rights in therapeutic discoveries.

If surprised by a question on the subject, one would, I suppose, reply offhand that the existence of proprietary rights in therapeutic discoveries is undesirable, and that for a physician to acquire such would be unprofessional conduct. At first blush, therefore, our sympathies would be with the object of these propagandists, if not with the means they employ.

Such is the force of tradition, for we shall find that if we take into consideration modern conditions, the reasons which determine our prejudices on this matter will not bear analysis.

The rules and customs of the profession on this and analogous subjects were formulated at a time when all therapeutic discoveries were made by practicing physicians. This is no longer the case. The majority of discoveries of this kind are now made by laboratory workers, many of whom are not physicians and very few of whom are clinical practitioners. It should be clear that the rules of conduct which apply in such cases cannot reasonably be the same as those which would regulate the behavior of clinicians.

The fundamental principle which underlies the restrictive rules invoked in favor of the opposite view is that nothing should tempt the physician to consider anything before the interest of his patient. In the cases we are considering, this principle need not be called upon. The furthest to which this restrictive rule has been pushed is, I suppose, to be found in the canon of the Royal College of Physicians of London. Members and fellows of that college cannot recover their fees by process of law, they are debarred from entering into partnerships and from having anything whatever to do with the dispensing or the sale of drugs. Failure to comply with these stringent rules involves loss of membership.

It is probable that we should still be without a great number of our most valuable modern remedies had there not been some substantial pecuniary reward to encourage research. Precisely what provision those who advocate the total suppression of all proprietary rights in therapeutic discoveries would suggest to meet this case does not appear. If they are running true to form, we shall do them

no injustice by taking it for granted that the necessity for such a provision has not yet entered their minds.

So much for those who "go the whole hog." Others would apparently act on the principle that only such proprietary rights should be confiscated, not, be it noted, expropriated, which are, in their opinion, of exceptional importance in the saving of life. You will not fail to note the odd consequence that would ensue. The more valuable to humanity the results of a man's work, the less would be his certainty of reward.

Perhaps it strikes an outsider as curious that the physician who charges up to \$50 for a Salvarsan treatment, should wax so indignant at Ehrlich or Ehrlich's assignees taking a few cents on each dose. This reflection would be fortified in the special case under consideration, for I understand it to be a fact that Ehrlich's share of the royalties goes to the institute in which he worked and is applied to the promotion of further research.

It is singular that this movement for the abolition of patent rights in remedies has been supported chiefly by those whose most useful propagandist work has been against secret proprietary remedies. Surely, there is here a strange inconsistency. Are they not aware that the fundamental purpose of the patent law is to encourage discoverers to reveal their processes, by giving them, for a term of years after the publication, a monopoly in the exploiting of their inventions?

That insufficiency of patent protection leads to secrecy and thereby prejudices the public interest is notorious among those who have devoted some attention to the history of the subject. Nor has this tendency entirely disappeared even in our own time. By a singular coincidence which renders my argument the more forcible, the very house which owns the Salvarsan patent, the great firm at Hoechst-on-the-Main, exploits a large number of immensely valuable products in connection with dye industry and with color photography, whose composition and process of manufacture are maintained a strict secret.

And yet, of all great chemical manufacturers, there is none more ready to place, without hope of recompense, their vast experience and knowledge at the disposal of the purely scientific research worker and to afford him generous material assistance, than the house of Meister, Lucius & Bruning. I speak of what I have personally experienced.

THE THIRD DEGREE.

The Illinois legislature having passed a bill, since vetoed, for the abolition of what is collectively known as the third degree, the local press has been much agitated thereby. One journalist, evi-

dently ill-informed on legal history, suggests in an editorial that such a proposition could only emanate from what may be called the namby-pamby school of penology. It would probably surprise this gentleman to know that the third degree is unknown in English criminal procedure and, while I think he would hesitate to qualify English criminal law as namby-pamby, nevertheless, it is generally admitted that crime is more satisfactorily dealt with, on the procedure side at any rate, in England than in any other country. The causes for this are partly historical, partly legislative and largely ethnic.

What sharply distinguishes the Common Law system from others is that a criminal trial under it is litigious and not, as in the continental system inquisitorial. Illinois, being a Common Law state, inherited the Common Law litigious methods. These have, however, been modified by statute until, at present, the preliminary procedure and method of prosecution more closely approach the French system than the English. Indeed, they differ from the former chiefly owing to the fact that the procedure in court is regulated by laws of evidence derived by development, one is tempted to say by hypertrophy, from the English system.

Which of the two systems, the litigious Common Law or the inquisitorial continental system is calculated to give the best results and should, therefore, be adopted is perhaps a problem that does not admit of a general solution. To a certain extent the answer must depend on the other institutions of the country, on the temper of the predominant race, and especially on their attitude on the subject of individual liberty. My opinion as to the relative value of the two systems may possibly be of some weight since I was brought up on the Common Law, and, for eighteen years, was most closely concerned with the administration of the continental system. The magistrates with whom I was so intimately connected, and to whom was entrusted the working of the system, were, with few exceptions, trained in the French school of jurisprudence. On the whole, my experience of the continental system has not produced such overwhelming respect for it as to cause me to share the regrets that have been expressed in Chicago newspapers at the threatened disappearance of one part of it from the local procedure.

With regard to the third degree, strictly so-called, it is difficult to understand how any liberty-loving people can tolerate it. Why the police favor it, has been succinctly, if somewhat hyperbolically, stated by a distinguished Anglo-Indian when he said, "It is so much easier to sit in a cool veranda rubbing red pepper into the eyelids of a recalcitrant witness, than to go out in the heat of the day, searching for material evidence."

There is no doubt in the minds of the majority of police experts

that excessive facility of arrest and interrogation leads to inefficient police detective work and, what is equally important, it strengthens the universal tendency of a police officer to "railroad" a case through against a man who has been long detained under suspicion.

It is significant that Goron, former Chef de la Sûreté of Paris and probably the most capable policeman of the Third Republic, in his memoirs strongly favors the English system. Further, Aristide Briand, when Garde des Sceaux (Minister of Justice) propounded a scheme for the introduction of this system, in principle, into French criminal procedure, but was overborne by the intensely conservative legal profession of France.

Few reforming enthusiasts realize what fundamental differences there exist in the reaction of criminals of different races to the same conditions. Perhaps an illustration of this will not be out of place. The third degree is practically unknown in French practice. It is replaced by its exact opposite—"La Cuisine"—the "cooking" of an accused.

When the examining magistrate after weeks of interrogation, has failed to extract information essential to a case, from a stubborn prisoner, he hands the latter over to the police.

At the "station" they have one or two men specially expert in "cooking" prisoners. They need a sympathetic manner, a jovial habit, and a perfect command of criminals' slang. The prisoner is placed in a good cell and the "cook" introduces himself. "Now, old fellow," says he, for example, "You've had a hard time lately, let's have a good feed," and a good feed they do have, chosen by the prisoner. During and after the meal the "cook" sympathizes with the prisoner, has a heart-to-heart talk with him, tells him that to know all is to forgive all, and that in his place even the virtuous magistrate might have done the same, and so on. The extraordinary thing is that French criminals under this process, *with which they are perfectly familiar and whose objects are quite open*, will often give up incriminating evidence that all the skill and authority of the *juge d' instruction* have failed to extract.

"Well," said one murderer on such an occasion, "you're a good sort of chap. Of course, I know what you're after—you want my head. All right, here you are; call the clerk and I'll tell all about it."

Can you imagine some of our Anglo-Saxon toughs expanding in this manner under the communicative warmth of a banquet and the cajoling manner of a fat policeman?

COLLECTIVE ABSTRACTS

THE RELATION OF THE GLANDS OF INTERNAL SECRETION TO GYNECOLOGY AND OBSTETRICS.*

BY HUGO EHRENFEST, M. D., of the Editorial Staff.

The problem of endocrine gland function at present forms one of the most widely discussed subjects and proves of ever increasing interest not only to the specialist but to the general profession. A committee of the American Gynecological Society has induced distinguished investigators to prepare complete reviews of various phases of this complex question and in this volume presents to the profession a complete and at the same time a clear and concise picture of the present state of our knowledge concerning the relation of the glands of internal secretion to the female generative tract.

Pituitary Gland (Goetsch).—Abundant experimental evidence and numerous observations on pituitary disturbances in the human subject have clearly established the close interrelation in function between the pituitary and sex glands. Overfunction of the pituitary anterior lobe is associated with overactivity of the sex glands. "If it were possible to examine the sex glands in the early stages of gigantism and acromegaly one would in all probability find histological evidences of very active spermatogenesis in the male and abundant ovulation in the female." The pituitary gland undergoes a kind of involution from the hyperactive state in acromegaly, and the early increased libido and hyperactivity of sexual function changes into loss of libido and even impotence in the male, and leads to cessation of menstruation and sterility in the female. Deficiency of pituitary secretion is followed by underdevelopment and aplasia of the genital tract in the young, and by sexual inactivity and retrogression in the adult.

Primary alterations in the function of the sex glands, as in pregnancy and after castration, are followed by pituitary hypertrophy and hyperplasia.

The specific action of posterior lobe extract ("Pituitrin," "Pituitary Liquid," etc.) upon the smooth musculature of the uterus and bowel has led to the wide usage of this drug in obstetrical practice and in the treatment of intestinal paresis following abdominal and pelvic operations.

The administration of pituitary extracts is of distinct benefit in clinical states of pituitary underfunction.

Pineal Gland (McCord).—From the lack of unanimity in the literature any conclusions as to the details of pineal gland function must be made flexible rather than dogmatic.

Because of the involution of the gland at puberty, the constitutional manifestations of pineal pathology appear to be confined to the prepuberal years. The essential characteristics (apart from pressure and neighborhood manifestations) are (a) early sexual development evidenced in the enlarged genitalia, pubic hair, general body hair, early change of voice; (b) precocious mental development, manifested in maturity of thought and speech; (c) general overgrowth of body.

*Review of a symposium prepared for the forty-second annual meeting of the American Gynecological Society, held in Pittsburgh, June 1, 1917.

The inference is allowable that the pineal gland is an organ of internal secretion whose function, however, is of minor significance in the general activities of the endocrinous system.

Parathyroid Gland (Voegtlin, Pool).—The parathyroid gland has a definite physiologic function which is still incompletely understood. The presence of a minimum of this tissue in the body is essential for life and the continuation of normal metabolism.

No direct relationship has been established between the parathyroids and the female sex organs; no morphological changes in the glands have been noted during pregnancy; yet apparently there is a connection between the parathyroids and the sex processes in the female.

Tetany, the clinical evidence of parathyroid insufficiency, is somewhat prone to occur in menstruating, pregnant and puerperal women, as well as patients suffering from gynecological troubles or who have undergone gynecological operations.

Pregnancy puts an extra strain on the functions of the parathyroid, as evidenced by the appearance of tetany during this period in partially parathyroidectomized animals. Tetany has been also observed during lactation in animals with parathyroid insufficiency. Interruption of lactation was followed by recovery.

The function of the parathyroids is apparently closely connected with calcium metabolism. There is reason to believe that maternal tetany and lactation tetany are associated with calcium deficiency.

Latent tetany, or a subtetanic condition, is much more common in pregnant and puerperal women than is usually assumed; according to Seitz and Thierry it occurs in 10 percent of all women during the last months of pregnancy, or in the course of childbirth.

The offspring of partially parathyroidectomized animals exhibit a marked increase in nerve irritability. Tetany in newborn infants born by tetanic mothers is usually fatal within a short time after birth.

In animals an intravenous injection of soluble calcium or strontium salts or hydrochloric acid almost instantly removes the symptoms of tetany. This cure, however, may not be permanent. Also the injection of parathyroid extract seems to have only a temporary curative effect on tetany animals. In the treatment of tetany of pregnant women the administration of calcium in large doses is followed by beneficial results in the great majority of cases.

Experimental facts do not support the theory that eclampsia is due to hypoparathyroidism.

Thyroid Gland (Marine).—The relation of the thyroid to the sex organs in the female is the most ancient and classical illustration of the interrelation of the function of glands with internal secretion. Such an interrelation in the female is recognizable in association with the development of secondary sex characteristics at puberty, with menstruation and with pregnancy, and also in the male at puberty, but to a very slight degree. During each of these periods the body metabolism is increased, and as it is a major function of the thyroid to stimulate oxidation processes in the body, it is probable that the heightened metabolism is of thyroid origin and that the enlargement of the thyroid at these times is the result of a true work hypertrophy. This view is supported by the facts that supplying the iodine-containing hormone artificially or even iodine, from which the gland can elaborate its own hormone in increased amounts, prevents the hypertrophy, and in any developing hypertrophy of the gland the iodine is reduced.

Thymus Gland (Pappenheimer).—The vigorous research that has been expended upon the thymus gland during the past few years has not, on the whole, been very fruitful. That the gland serves an important function, especially

in the growing organism, cannot be doubted. The fundamental problems of thymus function, however, remain unsolved, and the established facts are not such as lend themselves to clinical application.

Pancreas (Carlson).—All evidence supports the view that some substance or hormone secreted by the Islands of Langerhans into the blood is necessary for the utilization of sugar by the tissues. This function is specific for the pancreas. Other endocrine glands may influence sugar metabolism in a superficial way by altering the sugar mobilization. Hypo- and hyperactivity of other endocrine glands, however, do not produce actual diabetes in the presence of a normal pancreas. All the evidence points to the view that, in man, true diabetes is primarily the result of pancreatic deficiency. *There is at present no organotherapy of diabetes, experimental or clinical.*

There also is at the present time no evidence available of any specific relations of the endocrine functions of the pancreas to the gonads, male or female, or to menstruation, pregnancy or lactation. True diabetes, induced after conception, leads to abortion. Absolute diabetes probably renders conception impossible. Partial diabetes under careful dietary control permits of normal sex life of women (menstruation, normal pregnancy, normal child, lactation), and pregnancy under such conditions does not aggravate the diabetes. But in the absence of such dietary control the condition of pregnancy will aggravate the diabetes in the mother, and uncontrolled diabetes in the mother is extremely injurious to the fetus. There is some evidence that in late stages of pregnancy the fetal pancreas may functionate also for the mother.

Adrenal Bodies (Vincent).—The adrenal cortex or adrenal proper is developed from the germ epithelium, and the evidence is now strongly in favor of the view that it has certain important functions in connection with the development and growth of the sex organs. There is a considerable amount of clinical evidence that tumors of the adrenal cortex are frequently associated with sex abnormalities. This same evidence also favors the view that when cortical tumors occur in the female, an accentuation of male secondary sexual characteristic develops, and simultaneously a hypoplastic condition of the internal generative organs supervenes. During breeding and pregnancy the cortex enlarges. Feeding young animals with adrenal gland substance seems to stimulate the growth of the testes.

Ovaries (Loeb).—The most important conclusions drawn by Loeb are the following: The ovary is a complex gland of which the most important constituents are follicles in various stages of growth and atresia, and corpora lutea. In addition we find, in some species, interstitial glands and sometimes embryonic structures developing parthenogenetically from eggs.

Cyclical changes occur in the ovary and secondarily in the uterus and mammary gland.

The primary cyclical changes in the ovary are in sequence: follicle ripening, ovulation, corpus luteum formation. In some species ovulation is accompanied by degeneration of all but the smallest follicles.

An elaborate, self-regulating mechanism controls ovulation. Normally the corpus luteum inhibits ovulation. During pregnancy the life of the corpus luteum is prolonged. Experimentally ovulation can be influenced at will, accelerated by excising all corpora lutea, or retarded by producing artificial deciduomata. The retarding effect of the corpus luteum is chemical, not mechanical.

The corpus luteum has a sensitizing action on the uterus. If the uterus is incised or mechanically stimulated during the time when the corpus luteum is elaborating its growth hormone, a maternal placenta (deciduoma) is formed. The mechanical stimuli, therefore, assume in this respect the function which the ovum exerts under normal conditions.

Corresponding to and dependent upon the cyclical ovarian changes uterine cyclical changes occur. The cycle consists of heat, growth with associated glandular activity, regression and interval. Heat probably is due to maturation of the follicle and dependent upon the absence of corpora lutea. Growth activity is the result of corpus luteum secretion. Regression marks the cessation of this secretion, which in the interval is followed by a condition of rest. Pregnancy causing a persistence of the corpus luteum is characterized by an accentuation but not by a prolongation of the active phase, and an inhibition of the uterine cyclical changes throughout gestation.

While it is possible to produce, experimentally, during pregnancy, a new ovarian cycle, through excision of the corpora lutea, such a new ovarian cycle is not followed by a new uterine cycle. During pregnancy a mechanism is at work preventing the uterine mucosa from responding to the stimuli given off by various ovarian structures.

It follows that the corpus luteum subserves at least two functions, inhibiting ovulation and producing a substance which causes growth in the uterus.

The ovary shows other non-cyclic functions. It has a trophic influence on the genitals and, either primarily or secondarily, determines the development of the secondary sexual characteristics.

The ovary likewise controls the development of the mammary gland. It exerts a trophic influence on this organ and determines its normal cycle. During heat and subsequent to ovulation proliferative changes occur. These cease while the corpus luteum develops and functionates.

The incidence of breast cancer in mice is greatly reduced by castration.

Another paper in this symposium, prepared by Graves,¹⁰ considers the clinical features of castration in women. Specific surgical menopause symptoms consist chiefly of vasomotor disturbances in the form of hot flushes. These disturbances, theoretically at least, seem due to a break in the utero-ovarian functional harmony, by which the physiological balance of the glands of internal secretion is upset with subsequent dysfunctional activity.

After extirpation of the uterus, vasomotor disturbances ensue with approximately equal frequency, whether ovaries are retained in their original positions, totally removed, or transplanted. Retention of ovarian tissue after hysterectomy, therefore, is of little or no physiological value and may be productive of serious harm to the patient.

Placenta (Frank).—The experimental work of the last decade proves that Halban was correct in ascribing to the placenta an action upon the uterus and the breasts. Placental extracts (mainly the lipid fraction) rapidly induce hyperplasia of the uterus and breasts, both in castrated and non-castrated animals. The chemical substance which induces these changes is thermostable, very resistant to strong alkalies and acids, and completely soluble in 95 percent alcohol.

The substance appears identical in its physical, chemical, and biological properties with a similar substance obtained from the corpus luteum.

The substance can exert its influence in the absence of the thyroids, adrenals, pancreas, or in the absence of the thyroid and adrenals combined.

In view of this apparent identity of corpus luteum and placental substance, the question arises whether the placenta acts merely as a storage reservoir for corpus luteum secretion during the latter half of pregnancy, or whether the placenta elaborates a hormone of its own.

SUMMARY.

A careful study of these exhaustive papers, each prepared by a distinguished worker in a special field, must impress the reader with the striking scarcity of reference to clinical and especially therapeutic facts. The critical and

unbiased views of Frank, however, presented in form of an introduction to the symposium offer a most suggestive explanation for this seeming defect.

In contradistinction to the glibness, he writes, with which the terms "disturbance of internal secretion," "polyglandular syndrome," "hyper-, hypo-, or dysfunction" of this or that ductless gland are used, the basic conceptions held of the physiological and pathological action of the endocrine glands are often most vague and inaccurate. Much of this confusion is due to the flood of superficial clinical and experimental articles appearing daily in the literature. By mere force of number they becloud the issue and hide the occasional article of merit.

When the study of glands of internal secretion was in its infancy, only arresting and striking facts, such as amenorrhea and the castration symptoms, or gross abnormalities which could not be overlooked, such as premature sexual ripening, attracted the attention of the obstetrician and gynecologist. Today, on the contrary, many minor changes in appearance, behavior or physique of the patient are ascribed in the endocrine organs. If anything, this tendency to at once apply clinically the knowledge obtained by degrees at the bedside, the post-mortem table and in the laboratory threatens to mislead and to bring discredit upon an important branch of medical science.

How well taken this point is, is evidenced in the contribution of Morley, in which he shows that, even for the much employed extracts from ovarian tissue, today a method of physiological standardization or even a reliable method of preparation of the extract is lacking. Many of the marketed products, prepared in a faulty manner, of necessity prove ineffective. A comparison of results, therefore, obtained by laboratory workers or clinicians remains futile.

And once more quoting Frank: little if any advance can be recorded in organotherapy. The usual number of reports on the use and effects of corpus luteum extracts have appeared in literature. All those commercial extracts which the writer has examined, have proved inactive biologically.

The sole organotherapeutic preparation which can be relied upon is thyroid extract. Its use in gynecology and obstetrics, however, except in cases of gross deficiency of the thyroid secretion, is still largely empirical.

Both pituitrin and adrenalin are hormones which exert purely local drug effects, and do not replace the functional activities of the glands from which they are derived. Therefore, their exhibition is very limited.

Frank summarizes the entire problem of organotherapy in the following clear form:

According to our concepts of physiology, specific cells produce only specific secretory products. We, therefore, must assume that the specific cells of a given gland of internal secretion can elaborate one or more specific products, that this secretion may vary in amount or concentration, but not that it may vary in character. Therefore, the term "dysfunction" as now indiscriminately applied lacks all theoretical or experimental basis, and should be dropped from medical terminology.

By discarding "dysfunction," the problem is much simplified. A hormone may then be regarded as the specific product of a secretory cell, and a given type of cell can then be expected to produce only one (or more) hormones. Such specific secretory products, as we understand most clearly, effect distinct *drug actions*, which may be simple and rapid (adrenalin, pituitrin, etc.) or slow and less immediately apparent (thyroid substance). In any case, a potent hormone derivative should have a pharmacological activity, *which lends itself to standardization, and which can be demonstrated by biological tests.* Until this entire concept is grasped and applied, our efforts at organotherapy will

remain in their present state of crude empiricism in exact parallelism with the crudity of diagnosis in disease of the glands of internal secretion.

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*Printed in advance of meeting for the Fellows of the Society.

UTERINE SYPHILIS.

By JOHN T. WILLIAMS, M. D., F. A. C. S., of the Editorial Staff.

Although it seems obvious that syphilitic infection in the female must enter through the generative tract in the vast majority of cases, it is a matter of general experience that syphilitic lesions of the female genitalia are seen infrequently in gynecological clinics. The simplest explanation for this would be that the primary lesion, if located on the cervix or vagina, would be unobserved by the patient and the disease produce no symptoms until the development of the secondary eruption, when the patient would naturally consult the dermatologist rather than the gynecologist. Some writers have sought a still further explanation. Statistics have shown that syphilis is less common in women than in men. Nevertheless it is sufficiently common among women to be often met with by the dermatologist.

Gellhorn and Ehrenfest¹ state that they have never found a vaginal chancre in the examination of several hundred syphilitic women.

Thibierge² says that chancre of the cervix heals with great rapidity and leaves no visible trace.

Montgomery³ advances the theory that the greater activity of the thyroid in women results in the setting free of a considerable amount of iodine in the system which greatly reduces the severity of syphilitic infection in the female. It is certain that we get many positive Wassermann reactions in women in whom no other evidence and no history whatever of syphilitic infection can be found.

Gautier⁴ has found that the thyroid also secretes arsenic which is eliminated in the urine in the male but chiefly through the menstrual blood in the female.

Ries and Ries⁵ have demonstrated the presence of arsenic in the endometrium. Of course much further work is needed along the line of careful investigation of the genital tract in women known to be in the secondary stage of syphilis and the microscopic examination of suspicious ulcerations of the cervix for the *spirochaeta pallida*. Condylomata of the vulva are the most common and only well recognized syphilitic lesions met with in gynecological clinics. These usually start about the anus, or between the anus and the labia majora, and do not differ in appearance from the condylomata about the anus seen in the other sex.

Recent literature has been confined chiefly to tertiary uterine syphilis. The fund of actual knowledge of syphilis of the uterus is very scanty, but since the discovery of the *spirochaeta pallida* and the Wassermann reaction considerable interest has been aroused in this subject and particularly in the relation of syphilis to uterine bleeding.

The subject of tertiary uterine syphilis may be considered under the following heads:

- A. Gummatous ulcerations of the cervix.
- B. Syphilitic endometritis.
- C. Syphilitic lesions of the myometrium.

A. *Gummatous Ulcerations of the Cervix*.—Clinically these lesions are likely

to be mistaken for carcinoma. Gellhorn and Ehrenfest⁶ give the following clinical characteristics of specific ulcerations of the cervix:

- a. They produce very little secretion except in the case of extensive ulcerations.
- b. There is no pain either spontaneously or on touch.
- c. The ulceration is usually located at some distance from the os.
- d. The ulceration is sharp in outline.
- e. The ulceration is covered with a filmlike deposit which can be wiped off easily and exhibits a characteristic fatty lustre.
- f. There is very little inflammatory reaction in the surrounding mucosa.

The diagnosis, however, must be based upon microscopic findings, the Wassermann reaction and the behavior of the lesion under antiluetic treatment.

B. *Syphilitic Endometritis*.—Within the last few years considerable attention has been devoted to the possible specific origin of many cases of unexplained uterine hemorrhage. As far back as 1901 Morisani⁷ suggested that such bleeding might be due to syphilitic angiosclerosis.

Dreyer⁸ collected from the literature 14 cases of hemorrhage which were supposed to be due to uterine syphilis.

Muratow⁹ advised that all patients having uterine hemorrhage not relieved by curettage should receive antisppecific treatment. These papers were published before the introduction of the Wassermann reaction. Muratow (*loc. cit.*) also suggested that severe uterine hemorrhage in young girls might be the result of inherited syphilis.

In this connection it is well to remember that there are many extrapelvic causes of uterine hemorrhage which must be ruled out before making a diagnosis of uterine syphilis, as shown by the writer in an article published in this journal.¹⁰

Falk,¹¹ in 1909, reported a case of metrorrhagia associated with specific ulceration of the cervix in which the bleeding stopped after antisppecific treatment.

Meirowsky and Frankenstein¹² described three cases of tertiary syphilis in which there was amenorrhoea. In two menstruation returned after antiluetic treatment and the third menstruated vicariously through the nose.

McIlroy, Watson and McIlroy¹³ cite the results of the Wassermann reaction in one hundred gynecological cases. In only six of these was there a clinical history of syphilis yet there were 43 positive and 9 doubtful reactions.

Gellhorn and Ehrenfest¹ on the other hand, whose masterly paper, already mentioned, is destined to become a classic, after a careful analysis of 147 reported cases of syphilis of the internal genitalia, in which hemorrhage was the predominant symptom in 57, concluded that metrorrhagia, if at all due to syphilis, is caused by disturbance of the ovarian function and not by local lesions.

A few writers have presented accurate microscopic findings. Hoffman¹⁴ reported a case before the *Berliner Gesellsch. f. Geburt. u. Gyn.* The patient died from a prolonged puerperal infection. At post-mortem examination gummata were demonstrated in many organs. The endometrium contained numerous gumma like tumors. Lying between these were areas infiltrated with small round cells. For the most part the normal constituents of the endometrium were unrecognizable.

Recasen¹⁵ has described a form of specific endometritis in which the mucosa is thickened and hyperplastic. Ulceration of the endometrium is not infrequent especially in the tertiary stage.

Norris¹⁶ reported the pathological examination of a uterus removed because of a perforation inflicted during a curettage in a patient known to have syphilis. The endometrium was normal in depth or slightly thickened. Many blood vessels were present all showing signs of marked sclerosis. There was some fibrous tissue increase. The glands were normal in number, size and shape. Norris believes that the syphilitic origin of such changes should be confirmed by finding the *spirochaeta pallida* in the tissues. The Wassermann reaction alone is not sufficient proof.

C. Syphilitic Lesions of the Myometrium.—Norris (*loc. cit.*) divides lesions of the myometrium into:

a. A more or less diffuse metritis which is usually accompanied by an inflammation of the endometrium.

b. Gummata.

Here as in the endometrium the chief lesions are in the blood vessels and are of the same character.

Whitehouse¹⁷ reported 16 patients with chronic metritis. A positive Wassermann was present in 7. The symptoms were irregular and profuse flowing, or watery or mucopurulent discharge. In three cases the hemorrhage was so severe as to require removal of the uterus and a careful pathological examination was made of the extirpated organs. The uteri were slightly but symmetrically enlarged. Microscopical examination showed marked fibrosis with peri and endarteritis throughout the muscular coats. Spirochaetae were not found but there was a positive Wassermann obtained in all three patients.

SUMMARY

Our knowledge of syphilis of the female genitalia is markedly incomplete. While the infrequency with which primary lesions are found in the generative tract in women may be due in part to lack of systematic search for them, it also seems evident that syphilis does run a milder course in women and often escapes recognition.

The later uterine manifestations of syphilis may take the form of

A. Ulcerations of the cervix.

B. Syphilitic endometritis.

C. Syphilitic lesions of the myometrium.

Ulcerations of the cervix are most likely to be confused with malignant disease. The diagnosis must be made by the microscope.

In specific lesions of the endometrium and myometrium the characteristic changes take place in the blood vessels and are similar to syphilitic arteritis elsewhere in the body. There is usually some increase in fibrous tissue. The glandular elements are little if at all affected. The chief symptom ascribed to uterine syphilis is hemorrhage.

While scientific accuracy demands the examination of all suspected tissue for specific lesions and if possible the demonstration of the *spirochaeta pallida* as well as a positive Wassermann reaction, the practitioner who is beyond the reach of laboratory facilities will be justified in administering antisyphilitic treatment in any case of uterine hemorrhage not relieved by curettage, and where there is no local or constitutional condition capable of causing such hemorrhage discovered after careful clinical examination.

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ORIGINAL ARTICLES.

MODERN CANCER-THERAPY AND ITS RESULTS.

BY G. KOLISCHER,

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Most recently published reports of cancer-therapy, exclusive of extirpation by the knife, are confined to the description of the mode of employment and the results of one single method. While such reports are essential for the evaluation of each procedure dealt with, the pursuance of such a monotyped restricted policy is not in harmony with the experience of some observers, especially interested in cancer work, that, at the present time, the best results may be obtained by a parallel employment of all the modern methods available. We know that in certain instances radioactive substances will produce effects that were denied to x-rays and vice-versa; we are also aware of the fact that, where technical restrictions are placed on the use of x-rays on account of the peculiarity of the case, radioactive substances may be employed to advantage.

It is known that tumors having shown marked resistance to radiotherapy may become amenable to this method after they have been sensitized by autolysates and enzymes. We are in a position to make deep layers of tumors accessible to the influence of rays after their bulk has been removed by high frequency currents. It is a matter of experience that we may make progress with some method up to a certain point, and that then an absolute standstill will be observed, until a complimentary method is called in, which then furnishes a complete result in some cases.

It may therefore not be amiss to discuss the possibilities of all these methods at the instance of the individuality of certain cases.

Experienced observers maintain that the application of rays to cancers of the tongue implies a risk out of proportion with the percentage of possible good results. The assertion is, that in the majority of cases the raying forms the stimulus for an excessive growth of the tumor. Whatever now the reasons for it are, or how plausible any theoretical explanation may be, the fact remains, that if diathermy is administered previous to raying, no such irritation will be observed, though a definite curative result may not be obtained.

The coexistence of cervical glands in such cases will also be a factor in modeling the treatment. It is a common occurrence for the ray treatment of the original focus to lead to a fulminating growing of the glands—therefore it is advisable to deal with the glands first; that is to inject into them the enzymes and destroy them with the diatherm, after the reaction following the injection has subsided—then the treatment of the lingual tumor is started.

Palliative results will quite often be obtained to the great satisfaction of the patient and his attendants by the temporary repression of malignant tumors of the tonsils and fauces, both by diathermy and raying. Diathermy in the mouth, on account of its exquisite painfulness, has to be done under general anesthesia. The administration of ether by inhalation in such cases is not only inconvenient, but also involves the danger of igniting the ether vapors. All these drawbacks are avoided by obtaining general anesthesia through the infusion of ether into the rectum.

If diathermy is decided upon, a previously performed tracheotomy is needed, to provide against suffocation by laryngeal edema, and an obturating canula will effectively deal with the danger of aspiration pneumonia. This prophylactic tracheotomy deserves some discussion. Every time that the larynx, or the trachea, or both are displaced even to a slight degree only, by tumefaction, there is a great danger present, that the attempt at opening the windpipe may be followed by immediate death.

The changing of the topography by the preliminary dissection, especially if a deep tracheotomy is aimed at, may lead to annihilation of the anyhow reduced breathing space and death by suffocation, before the trachea can be opened and the canula inserted. Therefore, in such cases, the patient ought to be placed in a sitting posture for the operation and, previous to treacheotomy, intubation should be done. Such tracheotomies are performed very satisfactorily under local anesthesia. The oral and buccal mucosa is rather susceptible to the influence of radium and mesothorium and a successful employment of these substances may be frustrated by the production of burns on not involved areas—this is apt to occur if proper protection is not provided for, because the character of the growths in these localities calls for the application of large quantities of radium or mesothorium during extended single seances. This consideration makes it imperative not only to use carriers that keep the radium capsule exactly and constantly in the desired place, but also to slip over the containing filter a leadcap fenestrated in such a way as to expose to the rays the tumor surface only, while the rest of the oral cavity is completely screened off.

The same considerations hold good if a radioactive substance is introduced into the rectum in order to influence a prostatic tumor.

Only the surface of the filter that is facing the prostate is left free, while the rest of its surface is screened off by a leadcap of sufficient thickness to shut off all rays from the rest of the rectal mucosa.

In explanation of the injection of enzymes it may be mentioned that this procedure is believed to produce in the body defensive and protective ferments which instance in several cases seem to have exerted a decisive healing influence on malignant tumors, particularly so in cancers of the bladder, rectum and prostate.

If an attempt is contemplated to administer enzyme- and radiotherapy to tumors of the viscera entirely enclosed in the abdomen, an approach to these tumors must be established. This is accomplished by opening the abdomen at a suitable place and by anchoring the tumor in this opening. This ought to be done in such a way that the function of the organ carrying the tumor is not interfered with or is substituted in an appropriate way (gastro-enterostomy, jejunostomy, colostomy), and that in case the treatment should be successful, normal conditions may be easily restored by a secondary operation.

In the treatment of uterine cancers a distinction has to be made between cases that were not operated on at all and relapses after hysterectomy. In the former cases even if part of the portio vaginalis or the whole portio are destroyed and substituted by carcinoma there will be at least a crater left into which the radium or mesothorium container may be inserted, so as to utilize radiation in closest proximity to the cancerous growth. It also has to be kept in mind, that if a healing effect is obtained, cicatricial constriction will occur, thus preventing in time the insertion of the capsule high up inside of the uterus. This fact has to be kept track of, and dilatation has to be resorted to and repeated according to necessity, every time it is found, that the upper pole of the container does not reach any more the top of the fundus uteri. In case the uterine cavity should be elongated two capsules have to be employed at each sitting, one for the corpus uteri, the other one for the cervix and portio vaginalis.

If one has to deal with a relapse after hysterectomy for cancer as a rule the fornix vaginae is occupied by a more or less extensive tumor, and no cavity presents itself for the insertion of the capsule carrying the radioactive substance. The mere placing of the container into the vaginal stump would not answer the purpose because the larger part of the cancer would not be reached by the rays.

In such cases it is of advantage to coagulate all the accessible parts of the tumor by diathermy, the sloughing will furnish then a cavity into which the radium container may be placed, thus bringing parts of the tumor, otherwise not accessible within the reach of the radiation. In cancer of the prostate and cancers that occupy the base of the bladder the results will be far superior to the simple

radiation, if the application of radium or mesothorium is at each time preceded by the injection of the enzyme into the tumor. This is easily accomplished by forcing a long needle through the perineum either into the prostate or into the base of the bladder, the course of the needle being controlled by an index finger inserted into the rectum. That the injection really has reached the spot is proven if, shortly after this application, general reaction sets in.

In inoperable cancers of the mamma, primary or relapses, occasionally remarkable results may be obtained by the combination of diathermy and radiotherapy. In mammary cancer the enzyme therapy did not give any evidence of results.

In summing up, there are on our records now as "clinical cures" the following cases, the freedom of evidence of malignancy varying from three years to six months.

Seven cases of cancer of the urinary bladder.

Four cases of cancer of the tongue.

Two cases of cancer of the rectum—one of them complicated with metastases in the inguinal glands.

Three cases of cancer of the uterus.

Two cases of cancer of the prostate.

One case of cancer of the tonsil and anterior arch.

One case of retroperitoneal sarcoma.

Two of the cases reported carry a clinical diagnosis only.

While these cases represent only about three percent of all the cases treated, it must be kept in mind, that every one of them was inoperable, and according to our previous standards absolutely hopeless. In this enumeration are not included the cases of flat epitheliomata of the face and epitheliomata of the lip, successfully treated in our department.

DEEP ROENTGENTHERAPY AND ELECTROCOAGULATION IN THE TREATMENT OF MALIGNANT DISEASE.*

By GEORGE E. PFAHLER, M. D., Philadelphia, Pa.

The statistics prepared by Frederick L. Hoffman, Statistician of the Prudential Insurance Company of America, and Chairman of the Committee on Statistics of the American Society for the Control of Cancer, show that 9.6 percent of the death of males and 18.6 percent of the death of females were the result of malignant disease during the year 1914, in ages of 45 and over. He also states that the mortality from cancer in the United States now exceeds 80,000 per annum, and that the rate of mortality from this disease is increasing approximately 2.5 percent per annum.

With these alarming statistics and this tremendous increase in the rate of development of cancer, or in the rate of mortality of cancer, we must realize that, unless something definitely is done to check the disease, it must become almost or quite universal. Therefore, no subject can be of more interest to the general profession than the study and treatment of cancer. Unfortunately I cannot bring you any universal cure, nor any miraculous cures, but I can say definitely what has been said by others before me, that—if all the knowledge that is available at present is utilized intelligently and conscientiously by the practicing physicians of America—the mortality from this disease can be tremendously reduced, and probably only a fraction of the cases will remain to die from cancer.

Prophylaxis.—This paper is not upon prophylaxis, but nothing that I could write could be of nearly so much importance, for, if all sources of traumatism and chronic irritation and the effects thereof be removed as early as possible, the great majority of cancers that now develop will never have an opportunity to make their appearance. Therefore, I would like to emphasize the importance of eliminating irritations of the skin and mucous membrane, traumatism and chronic inflammation of glandular structures, the removal by surgery, or destruction by electrothermic coagulation, of slowly healing wounds, ulcers, moles, warts, and benign tumors. When they cannot be made to disappear by simple measures, they should be removed surgically, or I believe better by electrothermic coagulation or electrical desiccation, when these two measures are possible. In many instances these benign lesions are neglected by patients because of their terrible fear of an opera-

*Read by invitation before the Medical Society of the County of Kings, Brooklyn, N. Y., May 15, 1917.

tion. Such patients can often be induced to submit to electrothermic coagulation or electrical desiccation, and equally good or superior results can be obtained. Neglect on the part of the patient is often due to the soothing and comforting words of the family physician. I believe the truth plainly told would accomplish better results, for I am sure more people die from neglect than from fright.

While my subject this evening is the treatment of "Malignant Disease by Deep Roentgentherapy and Electrocoagulation," I do not wish to imply that I have lost faith in the surgical removal of malignant disease, for I believe that the greatest field of usefulness of the Roentgen rays is in the immediate postoperative treatment. Briefly stated, it is my opinion that all glandular involvement of the breast or lymphatic glands, or visceral carcinoma should be removed at the earliest possible moment, and should then be followed by thorough postoperative treatment. Malignant disease involving the skin and mucous membrane, I believe, can be more successfully and more satisfactorily removed by electrocoagulation, for it will involve less destruction of tissue, and give more permanent and satisfactory results.

The term "Deep Roentgentherapy" has been coined since the technique of crossfiring and filtration has been more perfectly developed, and the advent of the Coolidge tube, which makes possible the use of a tremendous quantity of deeply penetrating rays, which will permit of much filtration of the rays, and yet not overtax the patient's energy, or the time and patience of the operator in administering the necessary quantity. It implies what is now known to be a fact, that deep-seated malignant disease can be influenced by means of the Roentgen rays.

THEORY OF THE EFFECTS OF THE ROENTGEN RAYS ON MALIGNANT DISEASE.

The results obtained in the treatment of malignant disease depend primarily upon the exceeding sensitiveness of pathological cells to the Roentgen rays, for it is well known to all who have had experience with epithelioma, as an example, that with the same dose of rays given to the epithelioma and the surrounding tissue, the epithelioma undergoes degeneration and seems to melt away, while the surrounding healthy tissue may show no effect, or no more than a little redness. It has been shown, too, by histologic studies made on tissues which have been subjected to the effect of the rays, that these cells undergo degeneration before any effect is shown on the healthy cells. It is also well known that the more nearly cells approach the embryonal type, the more sensitive they are to the rays, and among normal tissues the essential cells of glands are more sensitive than the stroma, and next to the glandular cells come the protective epithelium, such as the skin, mucous membrane, and in-

tima of the blood vessels, and next to this the connective tissue cells.

Some very interesting and instructive studies of the microscopical changes taking place in the tissues of animals and human beings



Fig. 1.—Extensive squamous cell epithelioma involving part of the upper lip, two-thirds of the lower lip, and the inside of the cheek as far back as the angle of the jaw (A and B). No glands palpable. Destroyed by electrothermic coagulation January 20, 1913, and followed by deep roentgentherapy applied externally, and radium applied internally at the angle of the jaw, where the disease seemed to be most dangerous. C, the opening in the mouth nine days after the destruction, which opening closed by granulation to $\frac{3}{4} \times 1\frac{1}{2}$ inches. D, the mouth as closed by Dr. Laplace, January, 1914. The patient is still well May 15, 1917, four years and five months after beginning treatment of an otherwise hopeless case.

have been reviewed and recorded by Collwell and Russ in their book on "Radium, X-rays and the Living Cell."¹

¹Collwell and Russ, London, G. Bell & Sons, Ltd., 1915.

Contamin² has exposed tumors in mice to the x-rays under various experimental conditions, and draws the following conclusions: 1st. The action of x-rays is the greater, the younger and more actively growing the tumor is. 2nd. The disappearance of a large tumor causes the death of the animal, probably by intoxication.

The disintegration products of the cells which have been injuriously affected by the rays are eventually absorbed by the body. In the case of excessive quantities this leads to a state of intoxication.

In one tumor examined by Contamin, only a small area, the size of a pea, was exposed, the remainder of the neoplasm thus serving as a convenient control. The non-irradiated parts of the growth presented the character of a glandular carcinoma, the cells having comparatively little cytoplasm and the nuclei being round or oval. In the irradiated area, the most marked change was the formation of cavities resembling cysts, which originated in the center of the cellular masses constituting the acini of the growth. In addition to this cystic change, a prominent feature was the marked increase in the amount of stroma. The cyst contents, after treatment with the usual histological fixing agents, presented a finely granular appearance, while in the largest cysts hemorrhages were of frequent occurrence. These changes had taken place four days after the beginning of treatment. In the case of tumors removed eight days after the initial irradiation, cysts were (generally speaking) absent. The main feature was the enormous increase in the stroma and the consequent subdivision of the cell-masses into yet smaller islets, the sections presenting an appearance as if the cells were undergoing strangulation by the fibrous tissue.

The heredity of the characters thus imposed upon a tumor has been studied by Marie Clunet and Raulet-Lapointe.³ These new characters, which consist mainly of (1) a reduction in the percentage of successful grafts, (2) a reduction in the malignancy of the tumor, (3) a slower rate of growth and certain histological features of which the following were the most important: (a) the presence of "giant" cells, some cells attaining as much as four or five times their original diameter, (b) atypical mitoses, (c) basophile "giant" cells having multiple nuclei.

They found as a result of the transplantation of tumors, after irradiation has been entirely stopped, that there is a tendency on the part of the cells to return to their normal condition, but even in the sixth generation there were many cells to be seen, showing the abnormalities (a), (b), (c), produced in the tumor-cells by their previous exposure to x-rays. The practical conclusion they draw is that if the malignant cells in the human subject gradually assume

²Contamin *Compt. rend. acad. d. sc.*, June 6, 1910.

³Marie Clunet and Raulet-Lapointe. *Bull. Ass. franc. Roue, l'étude du cancer*, vol. IV.

less and less malignant features when exposed to x-rays this may only be manifested at some period remote from the time of exposure.

Clunet and Raulot-Lapointe have made elaborate researches into the nature of the changes produced in malignant cells in human subjects when subjected to x-rays. They removed sections during

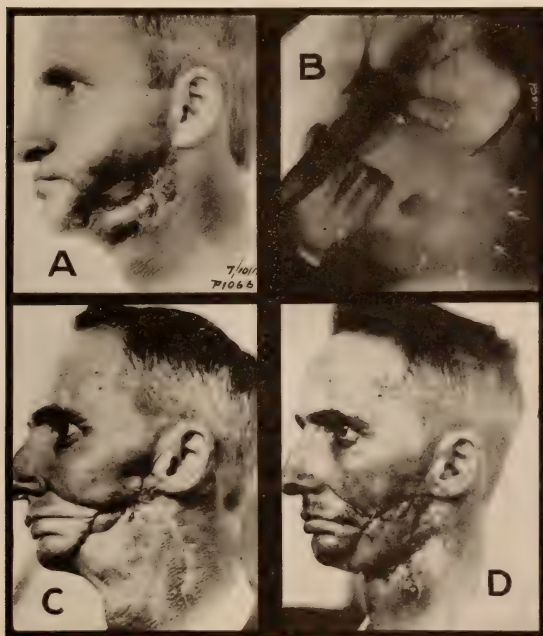


Fig. 2.—Extensive squamous cell carcinoma involving the cheek and the upper and lower jaw, with metastasis to the neck and with almost complete destruction of the lower jaw. A, the disease was destroyed June, 1915, by electrothermic coagulation, together with the removal of the metastatic glands in the neck and resection of the jaw done by Dr. Laplace. B, the wound with a healthy granulating appearance one month later. C, the wound almost closed, June, 1916. D, after a plastic operation by Dr. Laplace, June, 1916. May 15, 1917, the patient is still well and able to follow his occupation as a traveling salesman. The operations were followed by deep roentgentherapy.

the course of treatment of nineteen cases of squamous-cell carcinoma of malpighian type in the human subject. The state that, before the ultimate disappearance of the growth, the cells pass through at least five successive phases which are characterized as follows:

1. The latent phase. 2. Development of monstrous characters.

3. Keratinization. 4. Disintegration and phagocytosis. 5. Formation of the connective-tissue scar.

Their illustrations are most convincing of the effects of the rays on tumor cells. When sarcomatous cells are exposed to x-rays, the same authors found that a somewhat similar transition in the cellular characteristics occurs, but the latent phase, during which no changes are observable, is very much shorter than in the other types of malignant growth considered; instead of being from 6 to 10 days, it is generally 1 or 2 days.

Nogier and Regaud⁴ have submitted evidence, based upon a clinical experience of more than one hundred cases of malignant growths, that there often occurs a gradual diminution in the sensitiveness of these growths to x-rays; the clinical indication is that when a growth is exposed for the first time to x-rays a marked diminution in its size may occur, but when the rays are again applied after an interval of some days or weeks, the same dose of x-rays does not now appear to be so effective, and succeeding applications of the rays may have no apparent effect upon the growth. The remaining cells of the neoplasm appear to have become more resistant to the rays. This observation by Nogier and Regaud agrees with my own observations, and I am sure that it agrees with that of all other men who have had a wide experience, and is of considerable importance from a radiotherapeutic point of view, for it should decide to some extent the method by which radiation is best administered to growths which exhibit this phenomenon. I believe that it teaches the lesson that the largest dose possible should be given to a tumor from as many angles as possible, in a single course of treatment, so that this resistance to the x-rays will not have time to be developed by the cells.

TECHNIC.

Technic in Deep Roentgentherapy.—This has been described in recent papers and will not be repeated in detail here.⁵

Briefly stated, however, it involves the use of penetrating rays,

⁴Nogier and Regaud Compt. rend. Acad. d. sc., June 8, 1914.

⁵Pfahler: List of papers on Malignant Disease by the author:

a. Traitement du Cancer Cutané A L'aide Des Rayons X—Travail présenté à la séance annuelle de The Roentgen-Ray Society of America, 11 Sept., 1901.

b. The Treatment of Cutaneous Cancer by the X-rays (Thera. Gaz., March, 1902).

c. X-ray Therapy, with Report of Cases of Epithelioma, Recurrent Carcinoma of the Breast, Carcinoma of the Uterus, Carcinoma of the Esophagus, Tuberculosis of the Skin and Psoriasis (Philadelphia Med. Jour., 1902).

d. Carcinoma and Tuberculosis Treated by the Roentgen Rays. (Jour. Am. Med. Assn., Dec. 5, 1903.)

e. Notes on X-ray Treatment of Cancer, with Report of Cases. (Jour. Am. Med. Assn., Jan. 3, 1903.)

f. X-ray Therapy in Skin Diseases (Jour. Am. Med. Assn., Aug. 6, 1904).

g. The Treatment of Mediastinal Carcinoma with the Röntgen Rays (Am. Med., XI, 6, pp. 210-212, February 10, 1906).

h. The Treatment of Cancer by Means of the X-rays (Jour. of Med. Soc. of New Jersey, Feb., 1908).

i. The Treatment of Sarcoma by Means of the Roentgen Rays (New York Med. Jour., Dec. 21, 1907).

j. The Treatment of Epithelioma by Roentgen Rays (Jour. Am. Med. Assn., Nov. 21, 1908, pp. 1761-1763).

well filtered through as many portals of entry as is practical, so as to get as much crossfiring effect as possible upon the deeper portions of the disease. Through each portal of entry there should be given the largest dose compatible with the tolerance of the skin, but at no time should a burn be produced, and even redness of the skin is undesirable. This will vary somewhat with the individual and somewhat with the effects of previous treatment. For instance, any application of liniment or irritating ointment or iodine will hasten the development of a dermatitis.

The technique will also vary somewhat with the equipment used, and must be varied with the individual case. In a general way, I would state that for the administration of a dose of Roentgen rays through any portal of entry, I make use of a transformer, a Coolidge tube receiving 5 milliamperes of current for eight minutes, the tension of this current corresponding to a 9-inch parallel spark gap or approximately to 90,000 volts, the rays being filtered through 6 millimeters of aluminum or its equivalent and the focal distance being 8 inches.

Electrothermic Coagulation.—Electrothermic coagulation has been described by me previously in more detail.^(5-q) (^{5-t}). Briefly the process consists in the destruction of the malignant disease by coagulation produced by the heat generated in the tissue, because of the resistance to the flow of the electrical current. The type of current used is the high frequency of the d'Arsonval type. When used for destruction it is synonymous with the term "diathermy." It is also synonymous with the American understanding of the incorrectly used term "fulguration." It is nearly the same process as electrical dessication, as described originally by Clarke, except that electrical dessication involves the use of the Oudin current. I prefer the Oudin current and the electrical dessication method for very superficial lesions, because it can be more delicately controlled, and less destruction of tissue is produced.

k. The Treatment of Sarcoma by Means of the Roentgen Rays (Therap. Gaz., July 15, 1908).

l. The Roentgen Rays in the Treatment of Deep-Seated Malignant Disease (Am. Jour. Med. Sc., April, 1909).

m. The Treatment of Epitheliomata of the Lips and Mouth (Am. Jour. Dermatol., XIV, 2, 1910).

n. Inoperable Primary Carcinoma of the Breast (New York Med. Jour., April 26, 1913).

o. The Healing Process of Osteosarcoma Under the Influence of the Roentgen Rays (Jour. Am. Med. Assn., Aug. 23, 1913, pp. 547-552).

p. The Present Status of the Roentgen Rays in the Diagnosis and Treatment of Disease (Internat. Clin. II, series 24).

q. Electrothermic Coagulation and Roentgen Therapy in the Treatment of Malignant Disease (Surg. Genito. and Obst., Dec., 1914, pp. 783-790).

r. Roentgen Therapy in the Treatment of Deep-seated Malignant Disease (Jour. Am. Med. Assn., May 1, 1915, pp. 1477-1485).

s. Deep Roentgentherapy in the Post-Operative Treatment of Carcinoma of the Breast (Interstate Med. Jour., XXII, No. 10, 1915).

t. The Treatment of Malignant Disease About the Mouth by Combined Methods (Jour. Am. Med. Assn., Nov. 18, 1916, pp. 1502-1508).

u. The Treatment of Malignant Disease by Means of Deep Roentgentherapy and Electrothermic Coagulation (Surg., Gynec. and Obst., Jan., 1917, pp. 14-29).

v. A Conservative Treatment of Sarcoma with Pfahler (Surg., Gynec. and Obst., Feb., 1908, pp. 160-168).

w. Deep Roentgen Therapy (Pennsylvania Med. Jour., July, 1915).

In general, however, there is more danger to the welfare of the patient from too little destruction than from too much, for one must often sacrifice cosmetic effects for permanency of results in the treatment of malignant disease. It is a bloodless procedure. The diseased area is totally destroyed and then either cut away by curved scissors or allowed to slough away. It is very painful and must be done under either local or general anesthesia. It is especially indicated in malignant disease about the mouth, such as the lips, tongue, gums, teeth and tonsils, though, in one case I successfully removed an inoperable carcinoma of the breast which was referred to me by the late Dr. Rodman.

Cases Suitable for the Combined Form of Treatment.—Under this heading one may include all forms of malignant disease no matter where located if the disease can be totally destroyed without sacrificing essential blood vessels or nerves. This will include (1) all skin lesions; (2) all lesions of the mucous membrane. If, associated with the mucous membrane lesions, there is metastasis present, the glands should be excised surgically even though the lesions on the mucous membrane are destroyed by electro-coagulation; (3) scirrhus carcinoma of the breast which is inoperable because of its close attachment to the chest walls or involvement of the intercostal muscles, providing it is not associated with axillary glandular involvement.

CLASSIFICATION OF CASES AND RESULTS OBTAINED.

Epithelioma of the Skin.—Total destruction of the epithelioma by means of electro-coagulation or dessication followed by deep Roentgentherapy should cure practically all cases, and I believe, if properly done, all cases can be cured unless the disease has already extended to the deeper tissues and involves the cartilage or the mucous membrane, or, on the face, has extended to the ethmoid cells. The deep Roentgentherapy should be repeated at intervals of a month or more until one is quite sure that all the disease has been completely eliminated.

Epithelioma About the Mouth.—For details upon this subject, I would refer the reader to my paper before the American Medical Association on the "Treatment of Malignant Disease About the Mouth by Combined Methods." (5-t).

Epithelioma of the Lip.—Early in our work we depended upon the Roentgen rays alone in the treatment of small epitheliomas, especially those involving only the cutaneous half of the mucous membrane, and this group usually responds to the Roentgen rays. When the disease involves or begins on the true mucous membrane of the lip the chances of recovery from roentgentherapy alone is very much diminished. Today we always destroy the lesions on the lip by means of electrothermic-coagulation before giving x-ray

treatment, no matter how early, for one can obtain more definite results, and can get them well more quickly by thus combining the local destruction with deep roentgentherapy applied locally and in the glandular areas leading therefrom. I have treated many cases of extensive recurrence with metastasis both locally and in the tissues of the neck. Generally speaking such cases do not yield to roentgentherapy or even to combined methods of treatment. It is difficult or impossible to follow dispensary cases. Of the private cases treated, they may be classed as follows:—

1. *Primary Epithelioma of the Lip Treated by the Roentgen Rays Alone.*—In this group there are ten cases. Of these, eight have recovered, and have remained well from one to eight years. Of the other two, one discontinued treatment when he was nearly well, and the other case cannot be traced. We, therefore, obtained a disappearance of the disease in 80 per cent of the cases, though it must be considered that most of these cases treated had their beginning in the cutaneous half of the mucous membrane.

2. *Epithelioma of the Lip Treated by Electrocoagulation and Roentgentherapy.*—In this group there are thirty cases. In this group all but one recovered, and have remained well from one to eight years. The other case developed a recurrence and metastasis which was excised and followed by postoperative x-ray treatment. I believe that he will recover. It is remarkable that only one of this entire group developed metastasis. Therefore, we have obtained a recovery in 96.6 per cent. In the case of one of the patients there was a submaxillary metastatic nodule present at the time of the electrocoagulation. This was destroyed by plunging the needle directly into the nodule. This patient has recovered and has remained well two years. This is the only case in which I have treated a metastatic lymph node in this way. By this combination all types of epithelioma were treated, just as they came.

3. *Primary Cases Treated by Excision, Followed by Prompt Postoperative Treatment.*—In this group there are five cases. All have recovered.

4. *Local Recurrences Following Excision Treated by the Roentgen Rays.*—In this group there have been six cases. Three recovered. One has since died from intercurrent disease, but had remained well for several years. One recovered and remained well until he received a local injury again, when there was a second recurrence. This was excised, and followed by prompt x-ray treatment, but he did not recover. Another of the three that have recovered had in addition to the local recurrence, a small metastatic nodule in the submental region. This disappeared under Roentgen ray treatment, and he has remained well eight years since. The sixth patient is still under treatment, and I believe will get well.

5. *Recurrent Cases Treated by Roentgen Rays and Electrothermic Coagulation.*—Two patients have remained well approximately two years each.

6. *Epithelioma of the Upper Lip Treated by Electrocoagulation and Roentgentherapy.*—In this group there have been eight cases. Of these, five are known to be well, two cannot be traced, and one is still under treatment, but may be expected to recover.

It will be seen from a study of this group of cases that the results obtained by electrocoagulation and roentgentherapy will compare favorably with any other single method of treatment, no matter how extensive the surgical dissection may be.

EPITHELIOMA OF THE TONGUE.

1. *Epithelioma Involving the Dorsum and Side of the Tongue Without Metastasis.*—In this group there are nine cases. Of these, seven have recovered and remained well from one to five years. One never healed, and one is still under treatment. One has remained healed locally for a year, and then developed a metastatic nodule in the neck which, when removed, was found to be a squamous cell metastatic carcinoma which had undergone marked keratinization. I believe that he will recover.

2. *Epithelioma Involving the Tongue and Floor of the Mouth.*—In this group there have been nine cases. Of these, all but one healed primarily. One has remained well for a year. Another remained well for two years, and then developed recurrence.

EPITHELIOMA OF THE CHEEK.

1. *Epithelioma of the Cheek Without Palpable Glands.*—There are nine cases in this group. All are well from one to four years. One patient had associated submaxillary metastasis which was removed surgically by Prof. Ernest Laplace, December 15, 1914. This patient is still well.

2. *Epitheliomata Involving the Cheek, Gums, Jaw-Bone and Submaxillary Glands.*—In this group there are seven cases. Two are well over two years after beginning treatment. Three are still under treatment. The other two have died.

CONCLUSIONS.

1. Epitheliomata involving the skin, if treated early, should recover in all cases.

2. Epitheliomata involving the lip, if treated early, should recover in at least 90 percent of the cases.

3. The other cases referred for treatment are very generally in the inoperable class, and, therefore, every success is a distinct advance, and every failure only a loss of time, energy and effort.

4. Any lesion about the mouth which does not show a tendency to heal in a few weeks should be looked upon as possibly being malignant, and in case of doubt should be destroyed or removed. If a section is removed for microscopical study, the lesion should be destroyed at once.

5. I believe that early lesions about the mouth or upon the skin can be destroyed by electrothermic coagulation with less loss of tissue and with more success than by any other means.

6. Deep roentgentherapy should be added to any other method of treatment of malignant disease excepting possibly that of radium, the action of which is almost, if not identical to that of the x-rays.

7. Combined treatment by surgery, electrothermic coagulation, radium and roentgentherapy will cure some patients who are otherwise hopeless.

FIBROMATA AND THEIR COMPLICATIONS IN OLD AGE.

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Careful consideration of fibromas, occurring during the later years of life, is important, not because of the slight inconvenience which they usually cause, but on account of the suffering and many dangers due to the complications. While these tumors are more frequent between the ages of 35 and 45 than at any other period of life, they are very common during old age.

Fibromas and fibromyomas occur with equal frequency until after the age of fifty, when the muscle tissue in many of the fibromyomas is gradually replaced by connective tissue. This change is the same as takes place throughout the whole senile body, as the result of nourishment being insufficient to repair muscle waste but enough for connective tissue growth.

While fibroid tumors may occur in any part of the body where there is connective tissue and a blood supply, the most important in senility are those of the skin and uterus.

Those of the skin may occur about any part of the body but most frequently about the face, neck, shoulders, chest and abdomen. They may appear singly or in numbers. When small they usually lie entirely beneath the skin. When large they may be sessile or pedunculated. The size varies from that of a pea to a mass sometimes weighing several pounds.

The skin becomes much thinner and more easily broken as senile degeneration progresses, consequently the surface of a large subcutaneous fibroid is easily injured, and may become infected, resulting in ulceration.

There is but one main artery supplying a pedunculated fibroid and, if this is injured by twisting, compression, or otherwise, gangrene is apt to take place sometimes causing a cure of the tumor.

These skin fibroids frequently become very much irritated from the rubbing of the clothing or too much handling by the patient causing great distress.

Morestin¹ reported a case of an enormous fibroma of the neck of a man, aged 50, who had a similar tumor the size of a hen's egg removed five years previous. The present tumor reappeared under the scar in a few months. The patient was unable to move his head and had difficulty in eating.

Scannell² reported a case of a large pendant fibroma molluscum,

of ten years' growth, on the right arm of a Cuban, aged 72. In addition there was a large cyst of twenty years' growth on his neck, which had grown very progressively and caused no discomfort save the mechanical interference.

Fibromata of the nose are not very common in old age. They are well supplied with blood vessels which are sclerosed and consequently bleed freely. There is a great tendency for the patient to pick at them increasing this danger. Frequently great difficulty is experienced in controlling the hemorrhage.

These nasal tumors may also interfere with the free passage of air. In old people senile degeneration of the lungs is present, which decreases oxidation of the blood. Hence any tumor which causes an obstruction in the nose is a menace.

Fibromata of other parts of the respiratory tract have been reported but are rare, hard to recognize and seldom cause severe symptoms.

Cases of fibroma of the tongue, gums and other parts of the mouth have been reported, but they are not common at this time of life. They interfere with the proper mastication of food. They are subject to irritation by hot and cold drinks and food. Some of the old men constantly smoke pipes, which also is a source of irritation and may make the mouth so sore as to prevent them from taking sufficient food to properly nourish their bodies.

Fibromata of the esophagus, stomach, and intestines are rare but, when they do occur, digestion is interfered with and, as senile degeneration of the stomach and intestines has decreased digestion sufficiently to greatly lower nutrition, the increased lack may cause alarming symptoms. Partial or complete intestinal obstruction may be caused. When complete an immediate operation is necessary to save the patient's life.

Fibroma of the breast occurs, but it is impossible to differentiate it from an adenoma without the use of a microscope.

Fibromata of the uterus are the most common and are the cause of many dangers of which some of the greatest are:

1. Hemorrhage. There are few physicians who have not had great difficulty in controlling a profuse hemorrhage from a sub-mucous fibroid tumor in a sclerosed uterus. Many fatal cases have been reported.

2. Sepsis and necrosis of the tumor. Stark³ states that necrosis is indeed one of the most dangerous degenerations and one of the commonest in the later years of life, two-thirds of the cases recorded occurring between the ages of 40 and 70.

3. Ulceration which may occur as the result of infection. A very profuse and usually fatal hemorrhage occurs when these ulcers encroach upon the venous sinuses of the capsule.

4. Calcification which is always liable to take place in old age has

been reported by Zarnowski,⁴ Ludlow⁵ and many others. They may cause severe trauma, intestinal obstruction and many fatalities are the result.

5. Sarcoma as a complication of uterine fibroid has been reported, but is so rare that it need not be given further consideration.

6. Carcinoma is a serious complication. Professor Leith⁶ says: "Apart from fibroids, cancer of the cervix uteri is about twelve to fifteen times more frequent than cancer of the corpus uteri, but when fibroids and cancer are coexistent in the same uterus, cancer of the body appears to be as frequent as cancer of the cervix. Therefore, when the presence of a fibroid has been definitely ascertained, the possibility of the concurrence or future onset of cancer has to be borne in mind."

The following table given by McDonold⁷ is worthy of very serious thought in considering the frequency of malignancy complicating uterine fibroids.

Age	Total fibroids	Malignancy number	percentage
20-30	19	0	0
30-40	233	1	0.4
40-50	332	17	5
50-60	95	12	12.7
60-70	21	5	23.8

7. Axial rotation of a fibroid, as reported by J. Bland-Sutton.⁸ The patient was a spinster, aged 67, with a large tumor. The uterus was involved in the twist.

8. Pressure upon other structures. It may occur upon the ureters or iliac veins and end fatally. Gangrene of the leg, as the result of such pressure, has been reported. Pressure upon the colon, and especially the rectum, may cause partial or complete obstruction. This is a very common complication.

9. Colitis which may be caused by the continual irritation and pressure of a heavy fibroid uterus.

10. Carcinoma of the rectum may be aggravated by the same irritation.

11. The fibroid may be of such size as to compress all of the visceral organs and cause very much distress.

One of these enormous fibroids was removed from the uterus of a spinster, aged 64. The patient stated that her abdomen was large ever since she could remember, but never caused any degree of trouble until during the past two years. During this time she was troubled with shortness of breath, constipation, pressure on the bladder and difficulty in walking. She did not experience pain at any time.

Upon examination a very large mass could be felt in the abdomen. An older sister said that she had noticed that there was a lump in

her sister's abdomen when she was a small baby. The growth had been very gradual during these 64 years.

The patient was in such good condition otherwise that an operation was advised to relieve the intestinal obstruction and other distressing symptoms.

A twenty-five pound fibroid tumor of the uterus was removed with little difficulty except for the delivery of so large a mass from the abdomen.

The recovery was rapid and uneventful. The patient continued in good health for two years. At this time a sudden attack, associated with severe pain and "coffee ground" vomitus developed. A small growth could be felt at the pyloric end of the stomach. Death occurred in six months as a result of carcinoma of the stomach.

McIlroy⁹ reported a case of fibroma of the cervix occurring in a multipara, aged 56, who had suffered from metrorrhagia for three years and later on had marked pressure symptoms, the catheter having to be passed for several weeks. A fibroid tumor, weighing $3\frac{3}{4}$ pounds, was removed from the cervix with considerable difficulty.

Bergoin¹⁰ reported a case of fibroma of the ovary which occurred in a patient, aged 56, who had suffered from intermittent pain in the lower abdomen for three years when, finally, she was seized with a severe attack, accompanied by vomiting and fever. The operation showed a pedunculated right ovary. The pedicle was twisted once around and its cut surface showed thrombosed blood vessels. It was found to weigh 4,300 grams.

Hellman,¹¹ in reporting seven cases of ovarian fibroids, included one in a woman, aged 56, and another in a woman, aged 60.

Fibroid tumors in the broad and round ligaments have been reported but are rare. These tumors have also been reported as occurring in the anterior vaginal wall and urethra. In both locations they give considerable annoyance. There is danger from infection and from obstruction.

Fibromas in the peritoneal wall, kidneys and periosteum have been reported also.

Taking into consideration all of these complications with their many dangers, the only rational procedure to follow would be to remove all fibroids at any age as soon as the first suspicion of trouble arises. Reed¹² says that "the only safe place for a fibroid of the uterus, however small or large, however soft or hard, however recent or old, is outside of the patient's body." This statement would apply also to all fibroids. The early removal of a fibroid may save the patient much suffering and, frequently, a fatal termination.

These old people seldom show any bad effects after operations where a local anesthetic has been used. Nerve blocking is very suc-

cessful. They usually stand a carefully given general anesthetic very well. The danger of the fibroid usually is greater than the danger of the operation.

On account of the frequency of the association with malignant growths, in the later years of life, a course of x-ray treatments should follow the removal of all internal fibroids.

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PERSONAL EXPERIENCE WITH THE EXTRACT OF CORPUS LUTEUM.

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For the past five years I have used the extract of corpus luteum extensively both in clinic and private practice with the most satisfactory results. The cases suitable for its use are divided into three main groups: 1, young women complaining of nervous symptoms associated with menstrual irregularity; 2, women having artificial or post-operative menopause; 3, those in premature or natural menopause.

1. *Young Women Complaining of Nervous Symptoms Associated with Menstrual Disorder.*—*Symptoms.*—Headache is most frequently the chief complaint. It is usually periodic, though some have it constantly, with exacerbations, and it is always worse at the time of the menstrual period. Nervous irritability, depression, inability to concentrate, insomnia, and lack of energy are present, wholly or in part.

The menstrual disorder consists of oligomenorrhea, or too long, or too short intermenstrual interval, or dysmenorrhea, which is quite common. These patients give a history of having been irregular from puberty, or having been regular at first, the intermenstrual interval has been prolonged gradually until they are menstruating every five or six weeks and the duration of the period is two or three days, whereas it was formerly five or six days.

Dysmenorrhea is almost always present, varying in severity from cramps the first day, or until the establishment of the flow, to severe pain, requiring rest in bed, and attended by nausea and vomiting.

In some cases there is a history of rapid increase of weight, dating from the inception of the symptoms.

2. *Artificial or Post-Operative Menopause.*—*Symptoms.*—The patients complain of hot flashes, nervous irritability, vertigo, insomnia and headache, developing about two months after bilateral oöphorectomy. The previous condition of the ovaries determines the severity of the symptoms and the time of the onset. If they have been gradually destroyed by suppuration or become cystic, the symptoms are nothing like as severe as when they have been functioning normally when they were removed because of a pathologic condition of the uterus, as carcinoma. This is explained by the fact that in the former case, the body had accustomed itself to diminished or absent ovarian secretion.

The hot flashes vary from a momentary sensation of warmth to a feeling of suffocation forcing one to rush to an open window or door. The nervous irritability may be merely a feeling of tension, or inability to fix the attention, or to tolerate a noise, or even may be a state of melancholia. Headache, backache or pains in other parts of the body may be complained of. The menstrual function ceases suddenly or gradually, according to the extent of the operation.

3. *Natural or Premature Menopause.*—*Symptoms.*—At this time the same symptoms as are present after oöphorectomy manifest themselves but they are much less severe. - Headache and backache are quite common. A great many patients show a decided tendency to worry over trifles. Hot flashes and nervousness are present but are usually mild.

The menstrual function becomes irregular and the intermenstrual interval becomes prolonged as a rule, although it may be shortened.

The premature menopause occurs earlier than what is considered to be the average age and is more common in unmarried women and those who have put on weight rapidly. The symptoms are the same but somewhat more severe than in the natural menopause.

Indications.—The extract of corpus luteum should be given (1) to young women complaining of the nervous symptoms mentioned, associated with menstrual irregularity; (2) to control the nervous phenomena of the post-operative and natural climacteric; (3) in certain cases of dysmenorrhea not due to a pathologic lesion, especially where the organs are not fully developed; (4) for sterility when no diseased condition exists to which it can be attributed; (5) it should be tried in sexual anesthesia and hyperemesis gravidarum.

Administration.—It may be given by mouth in capsules, each containing from two to five grains, three times daily, or the aqueous solution of the extract may be injected subcutaneously, intravenously or intramuscularly.

There is no doubt but that the extract made from the corpora lutea of pregnant animals is far more potent and should be specified. Some women, who have no time to go to a physician's office, will take medicine regularly, but it is always a question what change an organic extract undergoes in the stomach and how much of it is absorbed. The aqueous solution, marketed in one cc. ampoules, each containing 0.2 gm. (3 gr.) of the desiccated gland, is more convenient and the dosage more exact.

I prefer the intramuscular injection because it is painless, easily administered and very quickly absorbed. I have never seen a case where the symptoms were so severe as to require intravenous injection. The contents of one ampoule is given at a dose, repeated

two or three times a week. Where it is impossible to see the patient so often, two cc. may be given at one time.

The extract must be administered in adequate dose and over a long period of time and failure to secure results is indicative of insufficient dosage. The reappearance of symptoms after the extract has been discontinued, is an indication for the resumption of its use. It is my custom to prescribe it two weeks after operation to prevent the development of nervous phenomena subsequent to oöphorectomy, which is much more satisfactory than awaiting the appearance of the symptoms. Administration is continued two months or longer, until there is no sign of nervousness, hot flashes, etc.

Associated conditions, such as anemia, constipation, or chorea should be relieved by appropriate remedies. Where weight has been put on rapidly, thyroid extract should be combined with the extract of corpus luteum. Specific treatment must be given to luetics.

Results.—The cases of menstrual irregularity and slight nervous symptoms of recent development yield the most brilliant results.

I saw, in consultation a Polish woman who had been in this country nine months without menstruating, although molimina were present regularly. Under intramuscular injections three times a week, she menstruated the second month after the treatment was begun.

My most grateful patients are three who suffered with headache. One, an unmarried lady of twenty-one years, who had headache almost constantly since the age of fourteen, one year after puberty, under extract of corpus luteum intramuscularly began to show improvement in two weeks and two months after it was begun, said that she was not only free from headache but felt better in every way than she had since she was thirteen years old.

The second, the same age, had suffered from headache, about every other day, so severe as to require rest in bed, since the age of fourteen, one year after menstruation was established. The headaches were more severe and more frequent near her menstrual periods, which occurred every five to six weeks. The flow was scanty and lasted three days. Under treatment the intermenstrual interval was shortened to a little over four weeks, the duration of the flow prolonged to six days and the headaches so diminished in frequency and severity that she was enabled to work as a seamstress with comfort and without interruption.

The third, reported in detail in a previous paper,¹ suffering from headache dating from the time of the menopause, was entirely relieved by the extract.

A young married woman of twenty, who complained of backache and headache, stated that she began to menstruate at eighteen, had two periods the first year, and after that one every five months, although molimina were present every month. She had been married fourteen months, but was never pregnant. She was of the blond type, had scanty pubic hair and the uterus was very small. Two grains of the powdered extract made from pregnant animals were given three times a day. Four weeks later she menstruated (seven weeks after her last period) freely and without pain. Her headache and backache disappeared and she felt fine until seven weeks later, when she complained of nausea in the morning. Examination revealed that she was pregnant.

¹The Therapeutic Use of the Extract of Corpus Luteum. Medical Record, May 19, 1917.

Two other patients became pregnant under treatment who had been disappointed in that way previously.

I am convinced that it is a very valuable remedy for the relief of sexual anesthesia. One patient who had taken it and the anterior lobe of the pituitary gland at different times, without knowing which was which, volunteered the information that the first (extract of corpus luteum) was more efficacious in this way and that her dysmenorrhea was almost entirely relieved by it. My experience in the treatment of cases of hyperemesis gravidarum has been very limited and with no results, perhaps because of the impossibility of giving it in sufficient dosage.

Rarely do I have to resort to bromide and never to valerian for the relief of the nervous phenomena of the menopause. Extract of corpus luteum in adequate dose and given for a sufficient length of time will control them most satisfactorily.

It is by far the most rational plan to put patients, who have undergone oöphorectomy, on the extract of corpus luteum soon after the operation, and forestall the nervous disorders which will inevitably follow.

Only one patient showed untoward effects of the treatment. She was a widow of twenty-eight, the mother of one child five years old, and had never been regular since puberty, which occurred at fourteen. Continuous administration caused sensations of faintness, dizziness and a feeling of fulness in the abdomen, with a lowering of the blood pressure from one hundred to ninety mm. of mercury. In this case it was found that if intramuscular injections were given on alternate days, beginning as soon as she felt cramps, the flow would appear after about the third dose and she would feel very much better.

CONCLUSIONS.

The extract of corpus luteum is the most effective remedy for menstrual irregularity in young women and for the relief of nervous symptoms which usually accompany it. It is a specific in certain cases of headache and should be tried where the ordinary remedies fail. It prevents the development of the symptoms of post-operative menopause and relieves those of the natural climacteric. It is useful in the treatment of sterility and sexual anesthesia and should be tried in hyperemesis gravidarum. Certain cases of dysmenorrhea are cured by it.

Wall Building.

VAGINAL AND VAGINOPELVIC OPERATIONS UNDER LOCAL ANESTHESIA.

By ROBERT EMMETT FARR, M. D., Minneapolis, Minn.

In consideration of the facility with which local anesthesia may be applied in surgery of the vagina and adjacent structures with satisfaction to the surgeon and safety and solace to the patient, it would seem that the practise followed by our leaders in surgical thought does not work out entirely to the best interests of the patient. My personal experience in this work has been so satisfactory and the procedure offers so many advantages over the ordinary method, that I cannot avoid the conviction that the failure on the part of surgeons, generally to use local rather than general anesthesia in this work must be due, more or less, to lack of familiarity with the application of novocain, and with the immense satisfaction resulting from its use.

With this idea in mind, it occurred to me that to recount, with careful detail, the technic which, in our hands, has been so satisfactory, might serve to stimulate the more frequent use of this method and, incidentally, might render some aid to those not so familiar with this kind of work. The nerve supply of this region is easily reached and blocked, infiltration is simple, and the anesthesia so safe and easy to attain that it would seem that general anesthesia should be used only occasionally in this work, rather than the reverse which is now true.

In all of this work the avoidance of pain is essential. Any move which will cause pain must be anticipated, and the surgeon must remain absolutely in the safe zone. I once saw a well known surgeon precede the operation of perineorrhaphy, under so-called local anesthesia, by pinning to the perineal body a sterile towel before any anesthetic had been given. Small wonder that this poor woman begged for mercy, and condemned the method. Furthermore, the individual who could bring himself to the performance of such an act is not properly constituted for the administration of local anesthesia. One must almost be able to feel the pain himself, so keen must be his sympathy. In no case is it to be an ordeal or a test of how much pain the patient can stand.

In this class of work much may be done to overcome the disagreeable features which usually precede and follow an operation. A good rest is assured by giving the patient a liberal dose of some hypnotic the night before operation. Upon awakening, she is given 1/200 grain scopolamin (Straube) and 1/3 grain of pantopon. She

should not see visitors, or be "fussed with" by the nurse before operation. If the patient is very apprehensive, this dose is repeated one-half hour before operation. This would seem to be a safe dose, and it is given only for its psychic effect. We consider it no more necessary here than in conjunction with general anesthesia, where it is likewise a great source of comfort. In elderly women one-half the dose mentioned is given with about the same effect. The ideal anesthesia is complete narco-local, with the patient in a light twilight sleep, with the addition of novocain.¹ There seems to be some doubt as to the safety of scopolamin in such large dosage, however, and the writer has not adopted this procedure, though



Fig. 1.—Invalid lifter, designed for the careful handling of operative patients.

from the viewpoint of comfort to the patient it is well nigh ideal. In moderate doses there seem to be almost no unpleasant effects.

The comfort of the patient is further enhanced by careful handling during the trip to and from the operating room, for which purpose I have devised an invalid lifter (Fig. 1). The knee-holder (Fig. 2) aids greatly in securing a comfortable position on the table, which is essential; the limbs are brought into position and the knee-holder adjusted to them. Another essential is the presence of a skilled anesthetist whose duties are to furnish the patient with water, advice, and every comfort possible; she records the blood pressure, controls the pneumatic injector, and keeps a written record

¹Farr, Robert E.: Narco-Local Anesthesia, *St. Paul Med. Jour.*, May, 1916. Narco-Local Anesthesia in Surgical Works, *Journal-Lancet*, Sept. 1, 1916.

of the several steps of the operation. Music is not objectionable and makes the time seem to pass more quickly.



Fig. 2.—Adjustable knee-holder, designed to give the maximum comfort to patient.



Fig. 3.—Painless method of making secondary wheal.

The operations most frequently presenting are curettage, amputation of the cervix, anterior colporrhaphy, perineorrhaphy, removal

of labial cysts, etc., the treatment of infections of the glands of Bartholin, urethral caruncle, the closure of fistulae, and vaginal hysterectomy. With the exception of vaginal hysterectomy, which, under certain conditions, does not readily adapt itself to this form of anesthesia, every one of these operations may be done under local anesthesia with satisfaction. Operations on the labia and on the urethral orifice, or on the skin of the perineum may all be done under direct or circumferential (Hackenbruch) infiltration, and present nothing different from the removal of growths from the skin on any other part of the body. The points which remain for consideration are: (1) The repair of the perineum; (2) plastics on the anterior vaginal wall; and (3) operations on the cervix and uterus.

1. *Perineum*.—Anesthesia for operations on the perineum may be accomplished by either of two methods or by a combination of these. A direct infiltration may be made of all tissues which are to be subjected to trauma, or the nerve supply may be blocked at some distance from the vagina. We have found most satisfaction from a combination of these methods. In former articles I have called attention to the necessity of always remaining outside the sensitive area in introducing the anesthetic. Naturally, there will be produced a slight amount of pain with the first needle prick. This should be the only real pain experienced by the patient throughout the operation. From this first point the point of future needle stabs may be anesthetized from beneath (Fig. 3). It is my practice to make the first dermal wheal just within the skin-margin at the mid-point of the posterior vaginal wall (Fig. 4). From this point the needle may be slipped along beneath the skin forward to a point opposite the clitoris, a liberal amount of the solution being allowed to escape as the needle is withdrawn (Fig. 5-A). This process is repeated on the opposite side and through the same stab-wound a second wheal is made from beneath, two inches to the right and left to the central point. From here the needle is introduced toward the tuberosity of the ischium until the deep pelvic fascia is pierced (Fig. 5-B). This procedure will be noticed by the patient but will not be complained of. This fascia is sufficiently dense for the surgeon to appreciate the passage of the needle through it. A liberal amount of novocain is deposited here over an area approximately the size of a walnut, moving the needle back and forth and changing its direction slightly at each stroke. The pudic nerve will be reached by the solution in this way. This procedure is repeated on the opposite side, and, in addition, a line of infiltration is established across the perineum (Fig. 5-C). One may now delay for a few minutes, when anesthesia will be complete and the perineal repair may proceed under perfect anesthesia; or, one may introduce the needle in the midline and, by forcing in a liberal amount of novocain, prac-

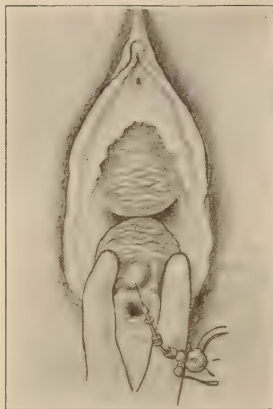


Fig. 4.—Point of making initial wheal in perineum.

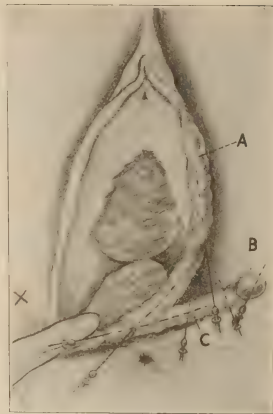


Fig. 5.—A, labial infiltration; B, pudic nerve blocking; C, line of perineal infiltration.

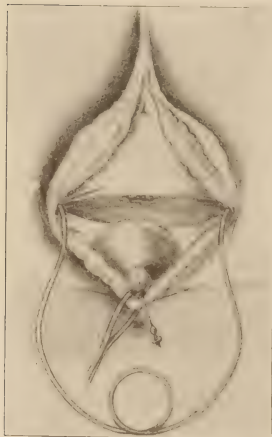


Fig. 6.—Infiltration or "blowing up" process of rectovaginal septum.



Fig. 7.—Circumferential infiltration of anterior vaginal wall.

tically dissect up the vaginal mucous membrane by means of the solution (Fig. 6). This takes but a few seconds and the operation may proceed at once. The whole procedure should be carried out with great deliberation, but, if done methodically, after a little experience it can be accomplished in not more than five minutes. The separation of the layers of the septum with blunt-pointed, curved scissors is facilitated by the "blowing up" process. Most of the fluid which has been injected between the vagina and rectum will flow out as the dissection proceeds and will in no way obscure the structure of the tissues with which we are dealing. Furthermore, the action of the adrenalin will so control the hemorrhage, and the structures will be so quiet on account of the absence of the transmission of respiratory movement, that the operation may be performed with greater ease than under general anesthesia, where the hemorrhage tends to obscure the tissues and the to and fro motion of the vaginal and rectal walls, which occurs in many patients under general anesthesia, tends to cause more or less embarrassment. Any type of operation one chooses may be used for the repair.

2. *Anterior vaginal wall*.—The anterior vaginal wall will be blocked to some extent by the above technic; however, the dissection is facilitated and the anesthesia is made so much more sure by the process of infiltration that we use it in the entire wall as a matter of choice (Fig. 7). The area to be excised or operated on may be circumscribed, or infiltrated directly (Fig. 8-A). The same general rules should be followed here as elsewhere. All infiltrations should be made from the point first punctured, or from points subsequently anesthetized from beneath (Fig. 3). In every case in which the introduction of the speculum, or traction on the same, produces any degree of discomfort to the patient, the first step of the procedure described above should be carried out (Fig. 5-A).

3. *Cervix and uterus*.—Ordinarily the cervix may be grasped without producing pain; however, many patients do complain of pain when this procedure is attempted. It has, therefore, been my practice to produce a wheal before the cervix is grasped by the tenaculum (Fig. 8-B). The technic for rendering the cervix and uterine mucosa anesthetic is as follows: With a four-inch needle (Fig. 9) a wheal is made to the right or left of the cervix. The needle is then advanced from 1.5 to 2 inches parallel to the midline of the uterus, traction being made on the cervix the while. As the needle is withdrawn the fluid is allowed to escape into the parametrium. The direction of the needle is changed with each stroke, and an effort made to inject the tissues to the side of the uterus, one-half to three-fourths of an ounce of novocain being used. This procedure is repeated on the opposite side, when dilatation of the cervix may be begun. In from five to ten minutes painless curettage

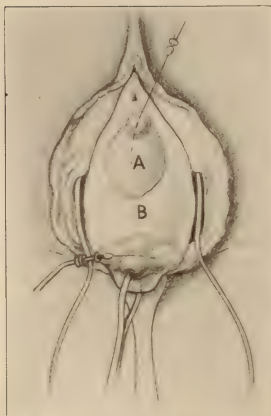


Fig. 8.—A, infiltration or "blowing up" process of vesicovaginal septum; B, infiltration of anterior vaginal fornix.

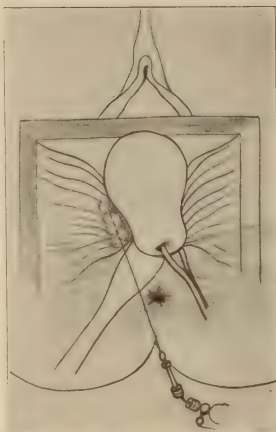


Fig. 9.—Schematic. Infiltration of right parametrium with novocain.

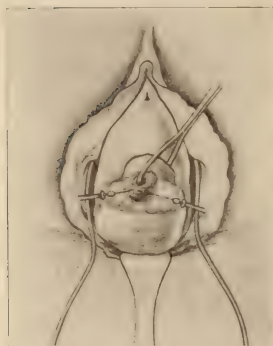


Fig. 10.—Infiltration of posterior vaginal fornix.

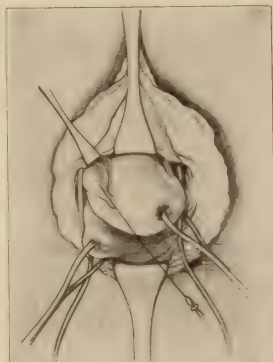


Fig. 11.—Vaginal hysterectomy. Fundus has been delivered through anterior fornix. Novocain infiltration of right round ligament.

may be accomplished. For amputation of the cervix a ring is infiltrated around the cervix in the vaginal vault, this infiltration being allowed to extend well into the tissues of the cervix throughout the entire circumference (Fig. 8-B and Fig. 10).

Hysterectomy.—My experience in the performance of vaginal hysterectomy is limited, as I much prefer the abdominal route for this work; however, we occasionally see elderly patients with uterine prolapse and ulceration of the cervix and the vaginal wall which

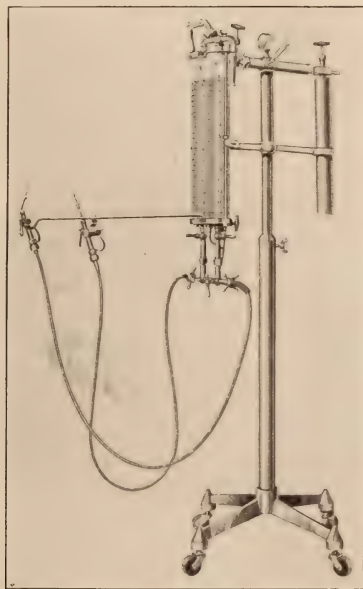


Fig. 12.—Pneumatic injector. For the introduction of local anesthetic solutions.

condition, in the absence of malignancy, is best handled by a vaginal operation. When necessary, this operation is preceded by a preliminary injection about the introitus (Fig. 5), as in the operations previously described. The area in the vaginal vault to be incised is outlined by a line of infiltration (Figs. 8-B and 10), the cervix is grasped with a tenaculum, and the procedure for blocking the broad ligaments is carried out (Fig. 9). Anterior and posterior infiltration is made sufficiently deep to anesthetize the peritoneum. The uterus is removed as under general anesthesia, care being ex-

exercised to make a secondary blocking of the round ligaments as soon as they present in the field (Fig. 11). Traction upon the round ligaments causes distress, but not great pain, and this should be anticipated by blocking as far away from the uterus as possible. They may later be united with the broad ligaments in the vaginal vault without difficulty. For the performance of the Watkins-Wertheim operation the vaginal wall is prepared as in Fig. 7, and a broad, deep infiltration made in the anterior vaginal vault. The uterus may be turned out and the round ligaments blocked after they are exposed and before traction is made.

A great deal of vaginal work must be performed in conjunction with abdominal work and here the method has considerable advantage. The delay necessary in making preparation for the second operation always necessitates prolonging general anesthesia and time becomes a more or less important factor. Where novocain is used, the element of time is a relatively unimportant factor; the element of labor, however, must be considered as the introduction of novocain solution with the ordinary syringe is quite irksome. For this work I make use of the pneumatic injector in all cases. It eliminates practically all of the disadvantages of the syringe and is often the deciding factor in the choice between general and local anesthesia (Fig. 12).

CONCLUSIONS.

1. A large percentage of vaginal and vaginopelvic work may be accomplished under local anesthesia more safely and with greater comfort to the patient than with the use of general anesthesia.

2. With a standardized technic and proper equipment the demand for general anesthesia in these cases should decrease more rapidly in the future than it has in the past, and local anesthesia should come into its own.

UNSUSPECTED CHRONIC APPENDICITIS RECOGNIZED DURING THE ROENTGEN EXAMINATION OF THE GASTROINTESTINAL TRACT.

By AMEDEE GRANGER, M. D., New Orleans,

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Cases of unsuspected appendicitis are not as uncommon as might be supposed. During the past three years the writer has discovered unmistakable evidences of chronic appendicitis in ten patients whose gastro-intestinal tract he was examining with the roentgen rays for supposed abnormalities in the stomach or the duodenum, and in whom the possibility of appendiceal disease was not even thought of. The symptoms in these cases were not constant but such as to suggest gastric or duodenal disease, and, with the exception of two, all the cases examined had been diagnosed, and by competent men, as probable gastric or duodenal ulcers. In the two exceptions, the diagnosis of gastric neurosis had been made. Not one of these patients complained of pain and tenderness in the right iliac region, and there was nothing in their histories which could have suggested that the appendix was the offending organ. The duration of the illness in these cases had been from a few months to nine years, with irregular intervals in the cases of long duration during which the symptoms would disappear altogether. All the cases had been under treatment, some for gastric or duodenal ulcer, others for various forms of dyspepsia, still others for neurasthenia or gastric neurosis.

A brief history of one of the cases will prove interesting. The case selected was the first of the series furnishing the subject matter for this paper, it was unusually interesting, and the patient, who was seen two weeks ago, has remained well during the three years which have elapsed since the appendectomy.

Mrs. R. P., aged 31, married, a native of a European neutral country, but a resident of the United States for about nine years. Referred for examination on Jan. 27, 1914, with a probable diagnosis of gastric or duodenal ulcer. At that time she stated that her trouble dated back eighteen months. She had been treated for dyspepsia by her family physician for several months before he referred her to a gastroenterologist. The latter made a diagnosis of gastric ulcer and, after treating several weeks decided that the ulcer if any had existed was healed and that she was now suffering

from some form of gastric neurosis, and he referred her to a neurologist. After remaining under his treatment for some weeks, and once during that time taking a rest cure, consisting in rest in bed in a quiet room and on a very restricted diet for a period of six weeks, without obtaining any permanent benefit she consulted the surgeon who referred her for the Roentgen examination, her mind fully made up to be laparotomized if necessary to find out the exact cause of her trouble and of having it removed if possible. She said that during the brief periods of well being which she had during

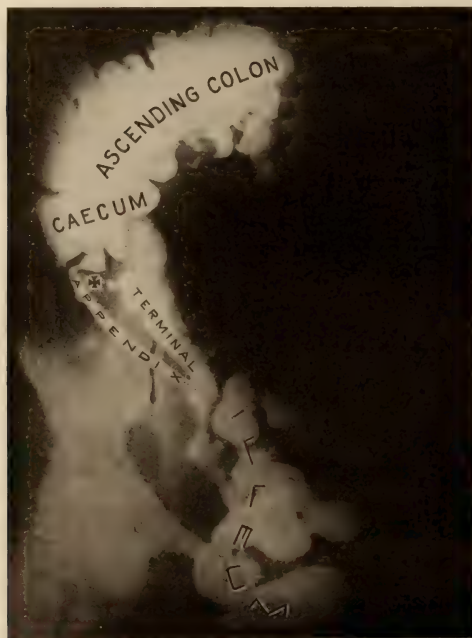


Fig. 1.—Appendix thickened and infiltrated. Band of adhesion at +.

the eighteen months since the beginning of her illness, she could eat anything and it caused her no inconvenience, but that at all other times everything she took, even milk, would produce a distressing sensation amounting often to actual pain in the epigastrium. The degree of the discomfort or pain did not bear any relation to the quantity or the quality of the food she took. At times

the unpleasant symptoms would begin immediately after eating, then at others not for two or three hours after. They sometimes lasted for a few minutes then again during the whole time of digestion. During her entire illness she suffered more or less from constipation.

The fluoroscopic examination of her stomach after the ingestion of the opaque meal showed an abnormal increase in the number and depth of the peristaltic waves, a decided tendency to spasmodic contraction almost amounting to the hour-glass type in the pyloric



Fig. 2.—Appendix kinked and adherent.

portion of the stomach, and a marked pyloro-spasm. There were no painful pressure points, no incisura, no filling defects, in fact no evidence of disease or adhesions of the stomach or the duodenal cap. The six hour plate (Fig. 2) shows no gastric residue, the opaque meal has passed beyond the hepatic flexure. The terminal ileum, caecum, appendix and the ascending colon are filled with it. The appendix is kinked. In the twenty-four-hour plate the appendix and caput caecum were still filled with the opaque meal and had the same shape and position seen in the six-hour plate. The terminal ileum, ascending and transverse colon were empty. We con-

cluded from that evidence that the appendix was the seat of chronic inflammation and that it and the cecum were bound down by adhesions. The patient was operated on during the month of March, 1914, and the Roentgen findings were confirmed. In answer to those who may suggest that the gastric symptoms may not have been due entirely to the chronic appendicitis and the resulting adhesions, and that the operation may have cured the neurosis we will state that shortly after being operated this patient and her husband, who



Fig. 3.—Appendix kinked and adherent.

although living in this country and intending to make this his home, had never become naturalized, went on a visit to their old home in Europe. They were there when the war broke out, and being still of military age he was ordered to the colors during the mobilization which was general throughout Europe. He sent his wife to London with instruction to await there news from him, as he intended to desert from his regiment, join her and return with her to their home and business in America. He deserted, met his wife in Eng-

land and they secured passage for this country. For days they feared arrest realizing fully the consequences of such an eventuality, and it was not until they got off the steamship and had left the pier in New York that they felt safe. When they reached New Orleans three days later, both were on the verge of nervous collapse, but her former trouble did not return.

After seeing three cases, we began looking for trouble about the appendix whenever we found spasmodic contractions of the stomach especially of the pylorus, with no six-hour residue, and no roentgen evidences of disease of the stomach and the duodenal cap.



Fig. 4.—Appendix visualized after thorough emptying of the caecum.

In such cases we always made a 10- and 24-hour plate besides the usual number of plates immediately after the opaque meal and the one 6 hours later.

If the appendix is not seen in either the 6-, 10 or 24-hour plates, we have the patient take two copious enemas and return for another exposure. In several instances retrocecal appendices which were not visible in the earlier plates because they were hidden

from view by the barium filled cecum became plainly visible after the colon had been emptied (Fig. 4).

The roentgen findings on which the diagnosis of chronic appendicitis was made in these cases were:

A fixed appendix shadow, meaning by that an appendix shadow which could not be moved by manipulation during a screen examination, or one found in exactly the same position and location on plates made at several hours' interval;

Or an appendix shadow showing persistent kinks or constrictions;

Or an appendix shadow still plainly visible hours after the cecum and the ascending colon could no longer be seen.

When the appendix shadow is not freely movable or when it is kinked or constricted the appendix will be found adherent, and the seat of chronic inflammatory changes.

An appendix that is not empty of the opaque meal when the cecum and the ascending colon are, is a non-functioning appendix, one whose walls have lost their elasticity and contractility. This is always the result of infiltration and thickening of its walls by the chronic and recurring inflammatory condition of the appendix.

In conclusion we wish to emphasize two facts:

1. That a patient may be suffering from chronic appendicitis and yet have no symptoms suggesting trouble with that organ, but present a clinical picture strongly suggestive of ulcer of the pylorus or of the duodenum.

2. That the appendix shadow is sometimes hidden from view by the shadow of the cecum, and can only be visualized by a thorough emptying of the cecum.

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WHAT THE GENERAL PRACTITIONER SHOULD KNOW ABOUT SYPHILIS.

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Editor, The American Journal of Syphilis.

[Continued from June Issue.]

DIAGNOSIS.

The ability to recognize syphilis in all of its phases and to rule it out from other diseases, constitutes one of the most important problems of the physician. Three types of patients in which syphilis must be considered present themselves; first, those who know they have syphilis; second, those who think they have syphilis, and third, those who have no idea they have or ever have had syphilis.

A thorough physical examination should be made in all cases. Not only should the symptoms or lesions which brought the patient to the physician be considered, but the entire body should be examined, including a thorough neurological examination, and such instruments as the sphygmomanometer, stethoscope and ophthalmoscope should be used. Certain laboratory procedures should also be performed which will be determined by the history and physical examination. When the chancre is present a search for the spirochete should be made in all cases, as this is the quickest and surest method of diagnosing syphilis at this time. The best method is by the use of the so-called dark field illuminator, but the *India ink* method and the staining of smears are more or less satisfactory substitutes.

A urinalysis and a Wassermann test should be made in all cases. The latter should be performed in some cases, perhaps, not so much for its diagnostic value, as a guide to treatment. Probably no other diagnostic aid has received such diverse criticism as the Wassermann test, and in spite of this it has survived and is today without question the most valuable test in the whole field of medicine. It is rather a complicated biochemical reaction, but its principles should be understood by all physicians as only then can its limitations be fully appreciated. This, however, is not the place for a discussion of the principles or technic of this reaction.

The Wassermann in the hands of a competent serologist is positive in practically all cases of untreated syphilis after they have become systemic. During the time the chancre alone is present the Wassermann, as a rule, becomes positive as the disease progresses. Thus the percentage of positive varies from about 25 during the

first week to about 80 during the fifth week. During the early systemic involvement, when, as stated above, the test is positive in practically 100 percent of cases it is markedly affected by treatment and a positive can usually be changed to a negative.

It is in the later course of syphilis, especially when the deep viscera are involved that the Wassermann possesses its greatest value. In untreated cases it is positive in about 95 percent of cases.

It has been pointed out that the Wassermann is not truly specific, that it is occasionally positive in diseases other than syphilis. In yaws the test may be positive, but this disease need scarcely be considered in this country. In malaria, during the febrile stage, when plasmodia are found, the test is often positive. Pellagra has been reported as giving positive tests, but in a series of thirty-five cases I failed to get a single even weakly positive. Certain investigators have stated that diabetics may react positively, but recent work has shown that some diabetics, at least, are syphilitic.

However, even if the above mentioned diseases are ruled out and the history and clinical evidence are against syphilis, a single positive should not be taken as conclusive. It should be repeated, and by another serologist, if possible. On the other hand, in the presence of suspicious history or symptoms, a single negative test should not be taken as conclusive. In this connection, the so-called provocative Wassermann should be mentioned. In certain cases of latent syphilis in which the Wassermann is negative, it becomes positive after the administration of a small dose of salvarsan. The blood for the test should be taken on the 2nd, 4th, 6th, 8th and 10th days after the injection of the salvarsan. A constantly negative result practically rules out syphilis.

In syphilis of the nervous system the Wassermann on the blood serum may or may not be positive. In paresis it is positive in from 90 to 100 percent of cases. Tabetics are about 70 percent positive, while in syphilis of the central nervous system, other than tabes and paresis, it is positive in from 75 to 80 percent of cases.

In these cases, especially the negatives, it is most desirable to examine the spinal fluid. In practically all untreated cases of syphilis of the central nervous system, the Wassermann on the spinal fluid is positive with large quantities, and other tests, such as enumeration of the cellular elements, examination for globulin and Lange's colloidal gold test are of great value. Finally, in the recognition of syphilis, it must be stated that there are certain cases which defy the acumen of the clinician and the skill of the laboratory worker, and a diagnosis must rest upon therapeutic tests.

PROGNOSIS.

Usually the first question asked by the syphilitic upon being informed of the nature of his disease is "Can I be cured?" In the

majority of cases this can be answered in the affirmative, although the answer should be qualified by certain provisos, the principal one of which is that treatment be followed energetically and consistently. The answer must also be qualified by the length of time the disease has existed, the amount and nature of the treatment already received and the portion of the body involved. Certain other factors which are obvious influence the prognosis to a greater or lesser extent. Such are the general physical condition of the patient, the presence or absence of intercurrent disease, the habits, the use or abuse of alcohol and tobacco, age, etc. Some of the older writers have asserted that spontaneous recoveries from syphilis occasionally occur, but in the light of modern knowledge of the subject, it would seem that such recoveries are impossible. It is true that all outward manifestations of syphilis may disappear and the individual seem in perfect health and die from some other cause, but nevertheless the spirochetes are undoubtedly present within the body.

SYPHILIS AND MARRIAGE.

When, if ever, can the syphilitic marry? This all important question has received many answers, some going so far as to insist that the marriage of a syphilitic should never be permitted. In the days before the Wassermann, however, a time limit was usually set, after which it was considered safe for an individual suffering with syphilis to marry. Thus, Fournier stated that a period of three or four years following the chancre devoted to the most careful treatment should elapse before marriage should be permitted, while Keyes considered five years after the chancre to be the safer limit. Since the advent of the Wassermann, most syphilographers have considered that permission to marry should not be given to a syphilitic while his test is still positive, even in the absence of other symptoms or lesions of the disease. With this view I heartily agree. If we believe that a positive Wassermann is an indication of living spirochetes, and we have every reason to so believe, there certainly is danger that these organisms will get into the blood stream and become a source of infection. To me, it seems that permission to marry should not be given the syphilitic until a complete cure has resulted. The standard for cure will be discussed later.

I readily admit that in some instances, perhaps in many, infection will not follow the marriage of syphilitics with positive Wassermann reactions, but certainly it is safer to wait for a complete serological as well as clinical cure. Possibly there are individuals who are so anxious to marry, even though they are aware of the syphilis of the ones they want to marry, that they are willing to assume the risk of infection. If such individuals do marry, they should be examined at frequent intervals for evidences of syphilis.

PROPHYLAXIS.

The prevention of disease is recognized today as of more importance than the cure, and the prevention of syphilis presents one of the most important problems before the medical profession. It is not by any means altogether a medical problem; it involves the entire fabric of society, and its solution must rest with sanitarians, sociologists, educators and statesmen, as well as with physicians. Naturally the prevention of syphilis resolves itself into two classes of measures, personal and public.

Personal Measures. As the majority of cases of syphilis are contracted through sexual intercourse, the first and most effective method of personal prophylaxis is the avoidance of sexual intercourse with any one not absolutely above suspicion; in other words, the avoidance of sexual intercourse out of the marriage bed. In our present state of social development, this is, of course, an ideal which cannot be attained. So, if men will indulge in illicit intercourse, some method of preventing the spread of venereal diseases, and especially syphilis, should be adopted. It has been said that the one who indulges his sexual passions illicitly deserves the penalty of venereal disease. This might be well enough if the offender were the only one to suffer, but every syphilitic becomes at least a potential source of danger to many others. It is, therefore, the duty of physicians to prescribe prophylactic measures for patients who desire them.

Probably the best and safest method of preventing the spread of syphilis through sexual intercourse is the use of the so-called "condom." This will prevent the spread of the disease from either party affected. Ablutions with liquid, such as weak solutions of potassium permanganate by both parties before and after intercourse is also quite efficacious.

One of the most widely practiced prophylactic measures is the use of calomel ointment (calomel 20, lanolin 40), as advocated by Metchnikoff and Roux, and proved by animal and human experimentation an absolute prevention of syphilis, if used within one hour after inoculation, and almost always a sure preventive if used within six hours after exposure.

The thorough application of Neiser's paste to the parts within a few hours after intercourse is probably better. This paste has the following composition:

Hydrarg, chlor. corrosiv.....	0.3
Sodii chloridi	0.1
Tragacanth.	2.0
Amylim	4.0
Gelatini.	7.0
Alcoholis.	25.0
Glycerini.	17.0
Aquæ, q. s. ad.....	100.0

Circumcision has been advocated as a prophylactic measure for syphilis, but to the author's mind this seems a rather useless procedure, as he has seen many chancres in the circumcised, as well as the uncircumcised. Purely as a measure of cleanliness and as a prophylaxis of masturbation in the young, circumcision is highly to be recommended.

The prophylaxis of genital and perigenital chancres not acquired through sexual acts rests upon care in using public toilets.

Chancres of the lips, tongue, tonsils, etc., are to be prevented by avoiding promiscuous kissing, the use of eating utensils, drinking cups, pipes, etc., after others.

Physicians could remove absolutely the danger of chancre of the fingers by the use of rubber gloves in all procedures in which there is any possibility of infection. And, in fact, if personal prophylaxis could be systematically employed, syphilis could be stamped out in a comparatively short time.

It has been hoped that a vaccine or a serum might be found which would immunize the individual against syphilis. But up to the present time no such prophylactic has been produced, although it is well within the range of possibility.

Public Measures. The public measures which may be taken to prevent the spread of syphilis, consist of the regulations of prostitution, education and legislation. Prostitution is as old as civilization and this is not the place to discuss its problems. However, I do want to go on record again that I am in favor of some regulation of this evil.

Education will help solve the problem of the eradication of syphilis. Teach all the youth of the land its dangers and a great stride will have been made. The legislative measures which might be taken to prevent the spread of this disease consist of passing laws making it a reportable disease and furnishing free treatment, and compelling all syphilitics to take it.

TREATMENT.

The treatment of syphilis may be divided into general, specific and symptomatic.

General.—The general treatment of syphilis consists of certain hygienic measures, such as regularity of sleep, regular meals, regular exercise, freedom from worry, pleasant surroundings, abstinence from alcohol, sexual excesses, etc., dietetic measures and hydrotherapy. Little need be said concerning the diet of the syphilitic, except in gastric and intestinal syphilis, and perhaps in syphilitic nephritis. Over-eating should be avoided, and the food should be wholesome and nourishing.

Baths, especially the baths in water from natural hot springs, have long been considered of value in the treatment of syphilis. In

fact, in many instances, marvelous cures have been ascribed to these natural hot waters. The two resorts which are noted most in this respect are Aix-la-Chapelle, in Europe, and the Hot Springs, of Arkansas, in this country. That the waters of these springs possess any specific action in the treatment of syphilis I do not believe. However, it is a fact, which I have been able to show many times, that individuals bathing daily in those waters are able to tolerate more mercury without untoward symptoms than those not bathing. Added to this, the pleasant surroundings, the freedom from business cares and worries, the outdoor exercise, the regular life and treatment, and the final fact that the patient makes a business of getting well, all aid in combating this disease.

Specific.—Two specific remedies exist for the treatment of syphilis, viz., mercury and the newer arsenicals, salvarsan and its allies. To this may be added iodine in some form, which, while not exactly a specific, as it does not destroy the spirochetes, is of a great deal of benefit in the treatment of certain cases.

By the administration literally of millions of doses of salvarsan, it has been shown beyond a shadow of a doubt that this remedy has an immediate effect upon the lesions of syphilis, as well as upon the Wassermann reaction. Ehrlich, the discoverer of salvarsan, stated, that while it was thought by some that the action of this remedy was that of a stimulant to the formation of antibodies which in turn attack the spirochetes, such is not the case, but that salvarsan acts directly on the organisms through the agency of the so-called chemoreceptors.

Mercury probably also exerts a similar effect. This drug has been used in the treatment of syphilis at least since the days of Fracastoro, and according to some writers, by the Chinese two thousand years ago, and, long before the discovery of the *spirochaeta pallida*, it was thought that the beneficial effects of mercury were due to the parasitocidal effects of the drug on the hypothetic causative organisms. Since Schaudinn's discovery, it has been shown that the spirochetes of experimental syphilis in rabbits are killed by intravenous injections of mercuric chloride, although the rabbits subsequently die of nephritis. There is abundant clinical evidence which shows that the lesions of syphilis are healed by the use of mercury. Considerable doubt has been thrown on the efficacy of certain compounds, especially the salicylate, by certain publications which show that intramuscular injections of this preparation apparently do not influence the Wassermann reaction. I have, however, been able to show that this does not apply, at least in all cases, to some of the soluble preparations of mercury, especially mercury benzoate. In a comparatively small number of cases which have received mercury alone, I have been able to reduce a four plus Wassermann reaction to negative, which has remained negative for periods from one to

six weeks, with intramuscular or intravenous injections of mercury benzoate.

In regard to iodine, it is probably not a true spirocheticide, but there is abundant evidence to show that it has a most beneficial effect on gummata, causing absorption, as well as on syphilitic arteritis.

With the evidence at hand as to the efficacy of the three syphilitic remedies, the logical method of treating this disease is to administer mercury and salvarsan as intensively as the patient can tolerate in all cases, and iodine in some form where indicated. This treatment should, of course, be started as soon as possible after the diagnosis of syphilis has been made. The urine of all patients should first be examined carefully for the presence of albumin and casts and a phenolsulphonephthalein test performed to determine the functional capacity of the kidneys. In cases with normal kidneys the average dose of salvarsan is 0.4 gm., although in small individuals the dose is less. Salvarsan is administered in fairly concentrated solution, that is, 10 c.c. for each 0.1 gm. of the drug. By this method two, three or four doses may be prepared at one time and administered in quick succession. The water for preparing the salvarsan should be freshly distilled into sterile flasks and autoclaved with the apparatus. All patients are instructed to eat a light meal on the evening previous to the administration of the drug, to take a mild purgative and to eat no breakfast. It is not necessary to administer salvarsan in a hospital, as it may be given in the office with perfect safety, but the patient should be cautioned to return to his room and remain quiet until the following morning, and to eat little, or nothing.

On the day following the administration of the first dose of salvarsan, mercurial injections are begun. I prefer the mercury benzoate to any salt of this drug I have ever used. While it is insoluble in water it is soluble in sodium chloride solution. The solution is prepared as follows: Two and five-tenths gm. of chemically pure sodium chloride are weighed out and placed in 100 c.c. graduated flask. About 50 c.c. of distilled water are added and the salt dissolved. Two gm. of mercuric benzoate are now carefully weighed out and placed in a flask where it readily dissolves on vigorous shaking. The flask is now filled to the 100 c.c. mark with distilled water, and the solution filtered through paper. It will be seen that each cubic centimeter contains 0.02 gm. ($\frac{1}{3}$ grain) of the benzoate. The initial dose is 0.5 c.c. containing 0.01 gm. ($\frac{1}{6}$ grain) which is rapidly increased to 1 c.c. if no untoward symptoms result. The injections are made deep into the muscles of the gluteal region, and, as a rule, cause little or no pain.

In certain patients, however, the pain is so great that they refuse to take the intramuscular injections. In these cases I administer

mercury intravenously, if the veins are sufficiently large and prominent. For these injections I also use the benzoate in the following manner: A 20 c.c. Luer syringe is filled to the 10 c.c. mark with sterile normal salt solution and the plunger removed. The dose of the mercury solution ($\frac{1}{2}$ to 1 c.c., containing $\frac{1}{6}$ to $\frac{1}{3}$ grain) is measured with a graduated pipet and dropped into the barrel of the syringe. The plunger is replaced, the solution thoroughly mixed and the air expelled. After placing a tourniquet around the arm just above the elbow, which usually causes the veins to stand out prominently, the needle is inserted into one of these veins and traction made on the plunger until 10 c.c. of blood have been withdrawn and mixed with the mercury solution, when the entire quantity of blood and mercury are reinjected. By this method the untoward symptoms of phlebitis and paraphlebitis do not occur.

Intravenous injections are difficult in some patients whose veins are either small or deeply imbedded in fat. In these rare cases when intramuscular injections are not tolerated on account of the pain, I prescribe mercurial inunctions. In cases in which gummata or arteritis are present, potassium iodide is administered by mouth in rapidly increasing doses. I usually begin with ten drops of the saturated solution in one-half glass of water or milk one-half hour after meals and increase the dose ten drops every day until symptoms of iodism appear.

In regard to the treatment of syphilis of the nervous system, I am firmly of the opinion that all such cases should receive intraspinal medication. It is true that certain cases of involvement of the central nervous system get well by other methods of treatment. However, there is no doubt that improvement is more rapid and greater when the intraspinal route is used. For injections of salvarsan intraspinally, I withdraw 10 c.c. of blood by venepuncture which is centrifugalized at once. 1 c.c. of clear serum is removed and placed in a sterile test tube. The salvarsan is then prepared in the usual manner, except that it is diluted so that each 40 c.c. contains 0.1 gm. The dose required for intraspinal injection, 0.1 c.c. (0.25 mg.) is added to the serum and placed in a thermostat at 37.5° C. for 45 minutes. It is then removed and placed in a water bath 55° C. for thirty minutes. As soon after the serum is prepared as possible the intraspinal injection is given. This period should not be over three hours. With the patient lying on his right side, near the edge of the bed, or on the operating table, lumbar puncture is performed. The site of the puncture (either the space between the third and fourth or fourth and fifth lumbar vertebrae) is painted with iodine and the skin infiltrated with a small quantity of a 5 percent novocain solution. When it is determined that the point of the needle is well within the subarachnoid space, the barrel of a 20 c.c. Luer syringe is attached to the needle by means of about

25 cm. of rubber tubing. The syringe is now lowered below the level of the needle and the spinal fluid allowed to run into it. When about 15 c.c. have flowed into the barrel of the syringe 1 to 2 c.c. of a 5 percent novocain solution are added, thoroughly mixed with the spinal fluid, and the barrel of the syringe raised above the level of the needle. This allows the spinal fluid and the novocain solution to run back into the spinal canal where it is left for three minutes after which it is again permitted to run into the barrel of the syringe. The salvarsanized serum is then added and injected in the same manner as described above.

Mercurialized serum is also used for intraspinal injections by adding 0.1 c.c. of the 2 percent of benzoate solution used for intramuscular injection to 1 or 2 c.c. of clear serum and placing in a water bath for thirty minutes at 55° C. It will be seen that the dose is 2 mg. (1/30 of a grain) and is injected in the same manner as the salvarsanized serum. The novocain solution used as prescribed eliminates, to a large extent, the pains in the legs and back which so frequently follow these injections.

Symptomatic and Special Treatment.—*Chancre.* The local treatment of chancre is, as a rule, extremely simple, consisting in uncomplicated chancres of washing three or four times a day in warm boric acid solution, bichloride solution (1 to 5,000) or potassium permanganate solution (1 to 4,000). Following this the lesion is dusted with aristol or calomel powder, or some similar preparation, and covered with a piece of sterile gauze.

Cutaneous Lesions.—Most of the syphilodermata need little local treatment, but the healing of the palmar and plantar lesions is hastened by the application of bichloride collodion or *unguentum hydrargyri nitratis*.

Condylomata should be washed once or twice daily with bichloride solution, dusted with aristol and covered with sterile gauze.

Mucous Membranes.—The syphilomycodermata, as a rule, require little or no local treatment beyond that of strict cleanliness. Such lesions in the mouth, however, should receive mouth washes and gargles such as potassium of chlorate or tincture of myrrh.

THE CURE OF SYPHILIS.

When should a syphilitic be discharged as cured? This is a question most difficult to answer, and certainly no hard and fast rule can be laid down which will cover all cases. In the first place, a clinical cure is, of course, necessary. If the patient is seen when the chancre alone is present and the Wassermann is negative, the length of time to continue treatment must be more or less empiric. It is probable, however, that in the majority of such cases that six or eight doses of salvarsan administered at weekly intervals, with daily injections of mercury, either intra-

muscularly or intravenously, pushed to physiological limit, will result in a cure. In later cases of syphilis in which the Wassermann is positive when treatment is begun, a constantly negative Wassermann must be obtained as well as a clinical cure. It is my practice to make a Wassermann test at each time salvarsan is injected. However, even after a negative is secured with two or three injections it is advisable to give most patients a "course" of eight or ten weekly injections of salvarsan with the mercury treatment, and potassium iodide if indicated. If following this treatment the Wassermann remains positive, a rest of from four to six weeks should be taken, after which the treatment should be repeated.

In syphilis of the nervous system, intraspinal injections should be made at intervals of from seven to ten days, and I consider it advisable to alternate salvarsanized serum with mercurialized serum. At the same time intravenous injections of salvarsan, and either intravenous or intramuscular injections of mercury should be administered as in other cases of syphilis. Such treatment is continued until eight or ten spinal injections have been made. If after this the spinal fluid is still positive, this treatment should be repeated following six or eight weeks' rest. It is a well known fact that certain cases exist which have been called Wassermann-fast; that is, the Wassermann remains positive in spite of three or four or more such courses of treatment as outlined above in which no clinical evidence of the disease exists. In such cases it is advisable to give a course of three to four injections of salvarsan and the usual mercury injections at least once a year.

Dugan-Stuart Building.

ACUTE SYPHILITIC HEPATITIS.*

By H. L. McNEIL, Galveston, Texas,
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The frequency with which syphilis of the liver is met with in the practise of medicine is a point of discussion by various authors. That it is a fairly common disease in the clinics of the John Sealy Hospital is shown by the fact that, among 1,000 autopsies done upon all classes of patients, 89 cases showed definite cirrhotic changes of the liver, which changes were probably of syphilitic origin, as judged by gross and microscopic examination, constituting an incidence of syphilis of the liver, therefore, of about 9 percent. Also, of these 1,000 cases approximately 300 were syphilitic, as judged by lesions found elsewhere in the body, thus indicating an incidence of disease of the liver, among syphilitics, of approximately 30 percent.

The types of lesions generally admitted to be caused in the liver by syphilis are of three varieties, as follows:

A *lobular cirrhosis* is perhaps best known. This is characterized by deep furrows, produced by cicatricial tissue which has taken the place of or has formed about previous gummata. Such a liver, the so-called "*hepar lobatum*," may be divided by the scars into a number of artificial lobes. This type of syphilis of the liver is quite characteristic.

A *diffuse syphilitic cirrhosis* of the liver has been described, resembling, grossly, that of the hypertrophic cirrhosis of Hanot except that jaundice is not commonly present in the syphilitic type. Such a liver is generally uniformly enlarged. It is firm and cuts with some resistance. The scars which are more or less characteristic of syphilitic perihepatitis are usually seen upon its surface, which is otherwise smooth. Microscopically such a liver is seen to be affected chiefly by a perilobular type of cirrhosis, as distinguished from the multilobular, or portal cirrhosis of Laennec. Frequently, in addition to perilobular cirrhotic changes, extensive and diffuse cirrhosis is seen involving all parts of the lobule (intralobular cirrhosis). Such a liver as this is usually described as occurring in congenital syphilis. Diffuse syphilitic cirrhosis, however, probably also occurs not infrequently in acquired syphilis^{1 2 3} as suggested by McCrae and others, and as confirmed by our own observations.

Perihepatitis caused by syphilis is generally admitted by

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pathologists to be quite characteristic of the disease. Such lesions consist usually of whitish or greyish, stellate or linear scars appearing upon the outer surface of the liver. Such scars may be minute or they may be relatively large. They average in size perhaps from that of a small pea to several inches in diameter or length. Upon section such scars may extend for a few millimeters down into the liver parenchyma.

Microscopically, these scars are seen to consist of fibrous tissue with occasionally some cellular exudation about the seat of the lesions. Miliary gummata in the capsule of the liver have been described. Adhesions between liver and other organs such as stomach, omentum or intestines may be produced by a syphilitic hepatitis.⁴

In addition to the above types of fibrotic changes found in syphilis, it is our purpose to consider the possibility of acute changes produced in the liver by the disease. That the great majority of cases of syphilis of the liver met with clinically are of a more or less chronic nature and that they represent the tertiary and late stages of the disease, is generally admitted. It is believed, however, by most clinicians who have been closely associated with syphilis in the practice of medicine that acute changes may be produced in the liver by syphilis, particularly by syphilis in its secondary or early tertiary stages. Numerous cases of enlargement of the liver with jaundice have, for example, been reported as occurring during the secondary stage of syphilis.^{1 5 6 7 8} Individuals affected with this form of syphilis rarely die, however, so that, so far as the author is aware, few authentic specimens of the pathologic lesions produced in the liver have come to light. An acute syphilitic hepatitis has, however, been noted in infants dying from congenital syphilis and it would seem probable that the lesions in the two types are more or less similar. Such lesions consist, in the case of congenital syphilis of a diffuse infiltration of the liver parenchyma with mononuclear cells and fibroblasts, such infiltration being both pericellular, perilobular, and intralobular in type. The liver so affected is larger than normal and a cholangitis may also be present.^{5 §}

§The nearest approach to the lesions supposed to be characteristic of early acquired syphilis of the liver which we have had an opportunity to observe was found at an autopsy performed by Professor Hartman in this clinic quite recently. I am indebted to Dr. Hartman for the opportunity to study the gross and microscopic appearance of these specimens.

The patient, a negro man, 48 years of age, had died of a malignant endocarditis. In addition to the lesions in his heart and lungs, which had caused his death, the liver showed the most interesting changes. The organ was considerably enlarged. Upon its outer surface the characteristic stellate scars of a perihepatitis were noted. It cut with some resistance. Excepting for the scars above noted, the outer surface was quite smooth.

Microscopic section of the liver showed a diffuse proliferation of new fibrous tissue everywhere throughout the organ, large numbers of fibroblasts being noted both about the edges of the lobules and within the lobules themselves (perilobular and intralobular cirrhosis). Moreover, while no gummata had been made out in the liver on gross examination, microscopic examination, in addition to the fibrotic changes, revealed numerous minute gummata scattered diffusely through the parenchyma. Evidently, therefore, we were dealing with a syphilitic liver in the very earliest stages of its development.

The first symptoms complained of by the patient which might have been referable to the lesions in the liver had been noted about one month before his admission to the hospital, and had consisted of slight tenderness over the liver

In spite of the paucity of pathologic proof as to the specific changes in the liver parenchyma giving rise to the enlarged and frequently tender liver occurring during the early stages of acquired syphilis, there is abundant *clinical* evidence of a hepatic or acute inflammation of the parenchyma as the causative factor.

In our series of cases diagnosed clinically as syphilis of the liver, consisting of thirty-four cases, all of which have been observed during the past five years, we have noted six cases in which the condition in question was strongly suspected for the following reasons. In all of these six cases the disease was strictly of an acute or subacute nature, none of the patients having been ill for more than six weeks before the consultation. In all cases definite hepatic enlargement was noted. Tenderness, not usually marked, however, was also noted over the liver in all six cases. Four of these patients had jaundice. Moreover, all six cases showed four plus Wassermann reactions, and finally all, except the one already reported, recovered promptly and completely under antiluetic treatment.

Information as to the time of the original infection in the class of patients (negroes) among whom most of these cases occurred is, of course, never very definite. It is interesting to note, however, that in three of these cases histories of chancres were obtained respectively six months, three months and two and one-half months previously. In three cases primary lesions were denied. In no case was a secondary eruption present at the time of treatment. Four cases had received no medicine before consulting us. Two had been taking some form of medicine given them for stomach trouble. In a number of the reported cases antisyphilitic treatment had been administered before the occurrence of the hepatic symptoms of the disease. No secondary eruption was present in any of these cases during the time of treatment. It seems probable that such acute cases at these are really the precursors of the more serious gummatous and cirrhotic changes which take place during the later stages of the infection.

SYMPTOMS.

The initial symptoms of acute syphilitic hepatitis are characterized rather by their paucity than by their seriousness. In the six cases in which this condition has been diagnosed, enlargement of the liver and tenderness over that organ have been the most constant findings. Jaundice, as has been mentioned, was present in four cases. Jaundice was never complete, however, as shown by the presence of bile in the stools of all of these cases. In two cases jaun-

and of abdominal pains. The liver extended four fingerbreadths below the costal margin on admission. The Wassermann was four plus positive. Rapid diminution in the size of the liver took place after the administration of mercury and potassium iodide. Death occurred from an entirely different condition—namely, malignant endocarditis, with multiple pulmonary infarcts, one month after admission to the hospital. Jaundice was present before death.

dice was only slight. In one case it was somewhat more severe. Gastric symptoms such as belching and a full dragging sensation in the epigastrium after eating were the chief complaints of two patients. Pain was the chief complaint of one case. No fever was noted at any time in four out of six cases. In two cases, however, occasional irregular rises in temperature were noted. Enlargement of the liver was noted in all of these cases, varying in amount from two fingerbreadths to a hand's breadth below the costal margin. The surface of the liver was smooth in all cases and the edge was moderately soft in four. In two cases it was described as hard.

The blood count was unchanged in all of these cases with the exception of a slight relative anemia in two. The white count was unchanged in all of these cases. It is interesting to note that four of these six cases occurred in women and that all except one were negroes.

DIAGNOSIS.

The only disease for which syphilitic hepatitis could be very easily mistaken would seem to be acute catarrhal cholangitis (acute catarrhal jaundice). The onset of the latter condition is usually fairly acute, however, with symptoms of gastrointestinal upset. The onset of syphilitic hepatitis is, on the other hand, not usually associated with any such unpleasant symptoms. Moreover, as distinguished from catarrhal jaundice, which is self-limited, patients affected with syphilis of the liver will become progressively worse after the onset of the disease, unless specific treatment is instituted. Also, marked hepatic enlargement is not usually noted in catarrhal cholangitis. The Wassermann reaction may, of course, be of the greatest diagnostic value. Finally, the therapeutic test is the diagnostic procedure *par excellence* in this condition, syphilis of the liver responding promptly to treatment and catarrhal jaundice remaining unaffected.

TREATMENT.

Most of our cases (four), have received mercury and potassium iodide alone. Two have also received salvarsan. The response would seem to be equally prompt after either method although it is our belief that if possible both mercury and salvarsan should be used in these conditions. It is our custom to give potassium iodide in generous doses to all cases diagnosed as hepatic syphilis in addition to the mercury and salvarsan.

CONCLUSIONS.

1. In addition to the more chronic forms of syphilis of the liver it is probable that an acute or subacute syphilitic hepatitis occurs not infrequently.

2. This condition is usually overlooked. It is the precursor, in all probability, of the later cirrhotic changes met with in the livers of syphilitics.

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ROENTGEN INVESTIGATION OF THE APPENDIX.

BY JOHN W. SHUMAN, M. D., Sioux City, Ia.

It is a fact that the appendix can be demonstrated by the Roentgen ray in every instance where its lumen has not been altogether obliterated. This fact is not appreciated by the profession at large. The object of this paper is to help advertise that fact. Visualization of the appendix by the use of the roentgen ray is distinctly an American contribution (George and Leonard). The use of the buttermilk and barium meal has a distinct advantage over other opaque meals in that it more readily enters and fills the lumen of the appendix. This method should be more generally used when diagnosing intra-abdominal pathology, when the appendix as a possible causative factor, is suspected.

TECHNIC.

The opaque meal used in the exposures here shown consists of one pint of buttermilk and five ounces of barium sulphate. The barium enema is of little or no use in showing the appendix. The first exposure for the appendix in these cases exhibited, was made at twenty-four hours after the barium meal. The roentgenoscope was used and in each of these cases the appendix was located. But plates are to be preferred over the screen as detail is better shown and, in many instances, the lumen is so small that the shadow, as in Fig. 6, would be entirely overlooked. All exposures were made in the prone position except Fig. 1. It should be remembered that a change of position is oftentimes necessary to bring a retro-cecal appendix into view. In some instances one must wait until the cecum has emptied before a retro-cecal appendix will show. Fig. 2 did not fill until about the 70th hour, this of course necessitating many exposures (17). The twenty-four-hour plate generally shows the appendix. The screen, associated with palpation, aids in diagnosing adhesions with reference to the appendix and "point" tenderness.

CASE REPORTS.

Every normal appendix will fill, see Fig. 1. The statement that any appendix should be totally obliterated after 35 years may be true, but still needs proof. The age of this case was 42 years.

Fig. 2. Male, aged 63, previous attacks of appendicitis. *Roentgen diagnosis*:—Obliterative appendicitis with adhesions. Operated March 24, 1916, by Dr. J. N. Warren and the diagnosis confirmed.

Fig. 3. Female, aged 39, complaint "indigestion." *Physical examination*.—Tender right iliac fossa. *Roentgen diagnosis*:—Chronic adhesive appendicitis. Operative diagnosis confirmatory. No attacks of indigestion since (ten months).



Fig. 1.—Normal appendix. Note "curl," which is transient. This appendix was empty ten hours later. Not operated on.



Fig. 2.—Roentgen diagnosis, adhesive and obliterative appendicitis (A). This exposure at the ninety-sixth hour. Diagnosis confirmed at operation.

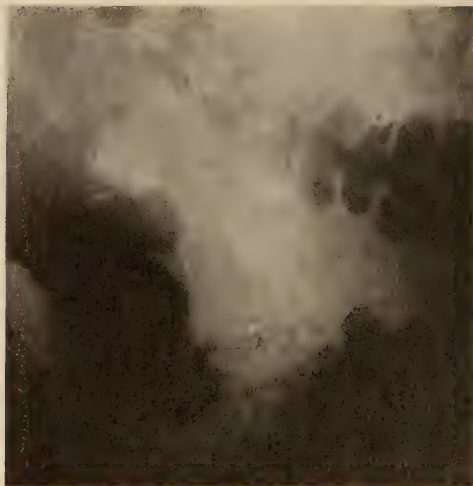


Fig. 3.—Roentgen diagnosis, chronic adhesive appendicitis. Note the filling defect and tortuosity of the appendix. Operative diagnosis confirmed.



Fig. 4.—Roentgen diagnosis, chronic appendicitis. Exposure at twenty-four hours. Note improperly filled, clubbed, and twisted appendix. Diagnosis confirmed at operation.



Fig. 5.—Roentgen diagnosis, chronic appendicitis with adhesions. Diagnosis confirmed at operation.



Fig. 6.—Note string-like, interrupted, and crooked shadow of appendix.

Fig. 4. Male, aged 28, referred for "ulcer treatment." Roentgen examination showed the stomach and duodenum normal, but the appendix as illustrated, imperfectly filled, kinked and with a clubbed extremity. This diagnosis was confirmed at operation.

Fig. 5. Female, aged 46, complaint, pain in both upper and lower right abdomen. *Roentgen diagnosis*:—Gall stones and chronic appendicitis. At operation seven cholesterol stones were found which corresponded in size and shape to the shadows read, also six real small ones. The appendix was considered by the surgeon as "pathologic" and removed.

Fig. VI. Male, aged 38, complaint, colicky attacks of pain across abdomen from right to left. Note the thread like interrupted shadow, read as appendix. Case not yet operated upon.

In conclusion, the roentgen ray is of great service in diagnosing chronic appendicitis. The roentgen ray is not advocated for those suffering acute appendicitis.

Frances Bldg.

SOME REMARKS CONCERNING ANEURISM OF THE THORACIC AORTA, WITH REPORT OF CASE.

By GEORGE M. NILES, M. D., Atlanta.

On July 29th, 1916, there consulted me H. L., aged 36, unmarried, who complained of indigestion, gastric flatulence and an annoying cough of a brassy and stridulous nature. He was an exceptionally fine looking man, with pleasing address and engaging manners.



Aneurysm of thoracic aorta. More prominent on left side. Rupture ten days after this roentgenogram was taken.

He owned and operated a taxi service, but did none of the laborious work. He had in times past indulged rather freely in the pleasures of both Bacchus and Venus, and incidental to the latter, gave a specific history.

He complained of a slight dysphagia, but no dyspnea. His appetite was good, but so much fulness and distress followed a liberal meal, that he feared to eat. When he could eructate freely, he was greatly relieved, so that his chief desire was for "medicine to stop the gas," or aid in its expulsion.

Physical examination was absolutely negative. There was no tenderness, no venous engorgement, no tumefaction at any area. Though he coughed often, it was laryngeal, and no rales could be detected.

A fluoroscopic examination disclosed a large pulsating shadow to the left of the sternum. Several roentgenograms were made, one of which is shown. Roentgenograms of the stomach and intestines revealed no organic abnormalities. No testmeal was taken.

He was informed, much to his surprise, that his condition was serious, and advised to keep absolutely quiet. He was put on soft diet, and "mixed treatment." He was also given a carminative. He would not stay in a hospital, but returned home in a somewhat skeptical frame of mind, evidently considering my words as those of an alarmist. His home physician was apprised of the situation, and a roentgenogram accompanied the report.

It is doubtful if the patient followed my admonition as to complete rest, either physical or mental.

Ten days after leaving my office, his mother, noting that he had remained too long in the bath room, sought him, and it was found that he had expired while at stool.

The following comments seem of interest in connection with this case:

First, the lack of symptoms pointing to aneurism, with the exception of the brassy cough.

Second, the lack of physical signs; for even after the diagnosis had been made, the presence of the aneurism could not be demonstrated physically.

Third, the prominence of digestive symptoms.

Fourth, the exceptionally healthy appearance of the patient, who was right in the shadow of death.

Fifth, the availability and worth of the roentgen ray in the ready and positive diagnosis of the real pathology.

THE PASSING OF THE MEDICAL PRESENT.

By JAMES L. TRACY, M. D., Toledo, Ohio.

Naturally, I do not like to think of myself, as being merely a "has been." In fact, no man enjoys looking at himself from that view-point. For this reason, I am writing of the things medical that I have known about, as being matters of the medical present. I am writing of those things as in the process of passing a fixed point. But just where in time, that fixed point is; into how many tomorrows, the present is projecting itself; and, with how many of the yesterdays, we are having to do today?—these, are all unsolvable questions that I am not wasting effort over. In a sense, this paper is an arraying of reminiscences; a sort of harking back. And yet I too well know what such means, to allow myself to become really reminiscent. The fact is though, that I have reached the place where, out of personal experience and contact with things, I am competent to write medical history.

In the days of our school books, we used to read of the passing of some of the things of general interest, as those writers saw them going by. We read: "Where we now sit surrounded by all that exalts and embellishes civilized life, there lived and loved another race, of beings." In classical style the writer went on: "Here, the warrior wooed and won his dusky mate, . . . and the wild fox dug his hole unscared." In the same book, Miss Francis took it up, and expressed the pangs of the passing of the ages in these words: "The lone Indian for many returning autumns was seen standing at the consecrated spot," but finally, in deepest grief, "he snapped his bow-string, broke his arrows, threw them upon the burial place of his fathers, and departed forever." I came upon the scene at a time a little later than that referred to by these historians. But so nearly contemporaneous with that period, was my boyhood, that I have seen the hole, that was dug by the fox; but the fox had gone. And too, under the tree where the lone Indian stood, as "he watched a loaded boat in its passage across the stream," and where he bade sad farewell to the aboriginal life which was a part of his being, I have found the flint-heads of those arrows; but their wooden shafts had dissolved away. To this aborigine, history making was a painful process. Medical history making is, however, not so distressful; particularly not to the physician. The flight of time, does not count for so much in the making of medical history, as do the medical things that time carries past. Indeed, one discarded practice of scientific medicine, of only recent adoption by the profession,

may in its desuetude be farther removed from present standards, than is another that was born and passed away, before the former came into existence. For illustration, note this life cycle:

A VERY DEAD SCIENTIFIC MEDICAL EPHEMERA.

Not longer ago than eighteen hundred and eighty-four, during a post-graduate course, I was taught by one of the then great obstetricians of the country, that when the notched nail of the index finger could not be made to cut through the placental membrane, to make use of an instrument that was always to be found in the room. That instrument was the hair-pin. At the time, the teaching was regarded by the professor, and by everybody else as a great hit. But I never dared ask for the hair-pin. I was afraid of the psychic effect upon femininity, of thus making the very common over into the very particular. I had no other reason for not following the instruction. Singularly enough though, a physician who is now one of the prominent abdominal surgeons of this city—and who graduated from the same college a little later than I did—actually added to his obstetrical popularity by this dignification of the hair-pin. For as many as ten years after our graduation from the college, we discussed that hair-pin question. It is a very dead practice to that surgeon today. At that time I was fairly well acquainted with his professional families, and this much can be said in defense of the hair-pin, that there did not develop among the new-born more cases of pediculus capitis and tinea tonsurans and like troubles, in this physician's practice, than occurred in the practices of physicians who did not in that way make use of the hair-pin—and whose obstetrical practice was in the same social level.

History is never merely a narrative of consecutive events. Neither does detail follow detail chronologically in this paper. Writing medical history, is rather the analyzing of the medical affairs of the times. It is the reading into—or rather the reading out of the things tangible and visible, the spirit and motive and the evolutionary force that produced the phenomena. The making of history, is the process of molding life. The writing of history, is making a record of those moldings. Therefore, medical history is:

A SHADOW ON THE MIRROR.

In order for me to be a medical student, it was necessary that I should have a preceptor. My preceptor was a graduate of a Western college; was a surgeon in the Civil War; and after the war took a post-graduate degree in an Eastern college. He was an educated man, did obstetrical work and everything up to and including major operations. As a medical student, I met the demands of the times and gave the anesthetic. A sorry supply for a crude demand; but I wasn't aware of the fact. We amputated the thigh

of a man. In some way the leg was given to my preceptor. When we dressed the stump, its condition was such that my preceptor, who had been working hard, was obliged to lie down before finishing the dressing. At that time pus was thought to be essential to safe healing. In this case there was enough. In a very crude way, I dissected the leg. In that community such a thing could not be kept quiet, and I was obliged to bury the leg because the patient could feel me at work upon it. Afterwards I dug it up and studied the bones. The patient made what was called in those times, "an uneventful recovery." It wasn't every day that such surgery was done, and I thought I could see in the way the doctor carried himself on the street, that he felt he was reflecting the public's sentiment of well done. I could feel that sentiment even in my own sphere. The doctor is still doing office practice in one of the Western cities.

In the analysis of passing events, it is often impossible to say of the molding processes in general, which features represent the actual evolutionary force, and which features are only the evolutionary force's agents. Nature is always trying of course, by the presentation of phenomena to call attention to the power behind the scene.

FRACTURED THIGHS, OR DESTINY.

In the first two years after I graduated, I had three fractured thighs to handle. It was a rough and tumble country with many accidents. The hospital in those days, was a woodmen's shanty. The bed, a bunk fastened to the wall. The trained nurse, the woodman's chum if he had one. And the surgeon, a product of the times. I fixed up one of those fractures in such surroundings, so that I felt proud of the job. The splint and all other appliances came out of the material at hand. In the middle of the next night I received word that the man was in bad shape, and suffering agonies. I found the man half out of the bunk with his shoulders and head supported by chairs and benches. The upper end of the fractured femur was at right angles with the lower. I hadn't known that the man was the victim of night horrors and that he furnished entertainment for his companions by spending a part of about every third night running around the shanty in his sleep, fighting with some demon. I sent the man to the county infirmary, and the physician in charge sent me word that he hoped I would die before I sent another like him. Fortunately one of the men moved away after getting around again. As I think of it now, I doubt if those legs were more than four inches shorter, but as the men walked around in that community, it seemed to me they must be at least six inches off normal. They lived for a long, long time. Naturally, I became a good deal interested in the subject of long splints, and when a skillful surgeon in the city brought out one, I investigated it. One day in our country hardware store I mentioned the splint

to another surgeon of the city, and he turned to a horse cultivator that stood there, and said "he would rather strap a broken leg to the cultivator, than to the splint I referred to." That the city reader may appreciate the surgeon's remark, the explanation probably ought to be made that a cultivator, is an agricultural implement, made by attaching several small plows to a common frame. A horse pulls this over the ground, the farmer walking behind and guiding it by holding on to projecting handles. Fellowship among physicians at that time was open-hearted and whole-souled. Those two physicians are still at it in heaven today, or else they are not happy.

In the Black Swamp a more or less used trail off into the woods, led either to an "opening," or else to a place from which timber had been hauled out. Following the trail to its end, settled the point. I rode into such an opening one day, answering a call to a man who had been stung by bees:

PHARMACOLOGY AND THERAPEUTICS.

As I got within about twenty rods of the house, my horse dodged to one side and stopped. We had reached the danger zone. From my saddle I could see the doors and windows of the house covered with bees as with a quilt. The farmer had tried to lead a calf, with a rope tied around its neck. The calf had made the usual calf circle around the man, and the sweep of the rope had tipped over several hives of bees. The man had escaped into the house. In the yard was what looked to be a collection of all the bees within ten miles. However, the most of the bulk was the dead calf. I never got any nearer to the house. In fact, didn't try to. The old women started the story that I didn't know how to treat bee stings anyway, and took that way of getting out of it. At that time a bill could not be collected for absent treatment, so I never presented a bill. Personal damage suits for malpractice were not common. For a long time evolution has been showing the need, in every community, of the specialty of pharmacology and therapeutics. From the very first, the need of the specialty has been lamentably apparent, and yet it is the last specialty to arrive. Nature is probably waiting for the ready-made medicines to be disposed of.

Anesthesia as anesthesia is known about now, is not knowledge born of one day. Forty years ago every physician was his own anesthetist. On the floor of a lumber camp I tried to administer an anesthetic, so that I could reduce a dislocated hip joint.

The choice of anesthetic was usually that of chloroform because its action was quicker than ether, and did not smell so badly. The odor of ether at that time did not appeal to the esthetic sense. After this man had taken a few whiffs of chloroform I had to stop and get him to breathing again. The second attempt was no more suc-

cessful. The third time, it seemed to me he would never breathe again. I telegraphed the city for help. Fifteen miles from help was as far off then, as seventy-five miles is today. I got a physician of wide experience. We went out to that camp in the night. I told him that if he would give the anesthetic, I could fix the hip. In a minute more, he was at work trying to resuscitate the man. The doctor had a flowing vein of very dry humor in his make-up. He let me draw my own inference as he remarked that, "the man wasn't any good with his hip out of joint"; and finally succeeded in anesthetizing him. Reducing the dislocation was the quick and easy part of it. Possibly the doctor is looking over my shoulder, as I write about that night. I don't know. Ten dollars made a pocket feel pretty full in those days. The man was an alcoholic and the relation between alcoholism and anesthesia was not so well understood then, as it is now.

The most of the work of chopping cord wood, making rail road ties and getting out timbers was done by honorable sturdy Canadian French people. Their women folks were tasty dressers in bright colors, and were exquisitely cleanly housekeepers. The unhewn logs on the inside of the houses, were always bright with white-wash, and the cookstove stood nicely polished in contrast.

THE PRICE OF MENTAL DEVELOPMENT.

In such a cabin home I was one night putting out some medicine, that I was blissfully believing would help conquer disease. Watching me, was a crosseyed French boy about sixteen years old. In my medicine chest was a wide-mouthed bottle filled with lumps of ammonium carbonate. In some way the boy got his eyes—or eye fastened on that bottle, and in the best English he could command he asked me over and over about that medicine. I answered him the best I could but after a while he reached my limit, and removing the cork I told him to smell of it and then he would know. I supposed he would become conscious of what he was handling before the bottle got very close to his face. But it seemed he had determined to take a good deep smell of it, and that in preparation for that kind of a smell he had really been exhaling while carrying the bottle up to his face; as when I glanced up, he had his nose hooked over into the mouth of the bottle. In a second he dropped the bottle, dashed out of the cabin into the woods for about thirty yards, wheeled and bounded back again and had got half way up the ladder to the loft, before the spasm let go. All of their neighbors and relatives came in when one of their number was sick, and the cabin was full, and I expected the boy would head a mob to lynch me. He didn't though, have any grudge against me, but told me afterwards that "he was afraid he would never catch his breath again." He had been to school.

In those days it was the unusual when a physician was consulted regarding a confinement before labor had begun. In one such rare instance I was told by the husband that his wife was again pregnant, and that in the previous labor there had been instrumental delivery.

DIAGNOSIS AND PROGNOSIS.

In passing their home, I had seen his wife, and had noticed that she had a short limb. Putting her obstetrical history and the short leg together, I figured out a deformed pelvis. I told the man I thought we were booked for a serious time. I can see now that evolution was trying to tell physicians that the proper thing to do under such circumstances, was to examine the woman. My opinion in the matter was duly passed around to all concerned, and much planning was made and a state of grim determination induced. . . . I followed the messenger to the home three miles away and went into a house filled with the most disgusted and maddest women I ever met. The baby was born. In fact, was born before the messenger reached me. Then I examined that woman's pelvis, and thought I could easily make out movement at the symphysis pubis. I told the women so, and tried to make them see how the condition might have been produced at the former labor. But the best I could make of it, was bad enough. Before reaching home a man racing his horse overtook me, and told me to hurry back as the woman was dying. I found her conscious, but making the most rapid frantic efforts at respiration. She lived only a few minutes. It was the only case of puerperal pulmonary embolism I have ever seen. The law governing the transmission of information is, that: The rapidity of the travel of community news is inversely as the square of the density of population. That is to say: If 500 people were scattered over a six-mile square territory of forest, news would reach every individual in one five-hundredth of the time that would be required if they all lived in the territory of a city block. Paul Revere understood it and flamed his torch. The outlawed understands the law, and so loses himself in the crowd. The news that traveled out from that case was not a help to my obstetrical practice.

Metaphysicians have a way of looking very wise when they say that action and reaction are always equal. And then they talk about the law of variation, and all that. I don't know. In my young days I did find out, however, that there was one woman in the community who could see something decidedly outrageous, in everything I did. Evidently, there was something in me, to which she fully reacted. She was the wife of a childless home, but wasn't to blame, and so in a way, I sort of pitied her. Notwithstanding the fact that she was the wife, she was unconditionally the man of the

house, as well. One day when the ague was racking her, body and very soul—because she had to do it—she sent for me.

MATERIA MEDICA.

In those days there were no capsules. But there was a way, by which an expert at it, could bake a flour dough between two hot flat irons, and make a flexible wafer in which quinin could be wrapped up. Not every one could do it though, and usually it came about that the quinin was taken straight. But as a matter of fact, most anything was better than ague. I felt a little temptation, but one can hardly carry personal grievance to the sick-bed, and getting the better of myself carefully explained to the husband in another room, how the quinin could be covered up, so she could take it and not taste it. I told him to put some dry sauce in a spoon, put the powder on the sauce, and then cover the powder with some more sauce. He was a little hard of hearing, but I didn't know it. The next day was her off day for having the ague, and so she was around. She met me at the door, and said "I needn't come in." I told her I was coming in any way. "Well," she said, "she wouldn't take another dose of my medicine as long as she lived. She said she would die first. That it was the worst dose of medicine she ever heard of." The husband was meekly sitting back in the corner. I told him to show me how he had fixed that medicine. After having tried to be kind to her, it looked as if she was trying to rub something in. He took a tablespoon and went into the pantry and returned with this spoon even full of epsom salts, and asked me "if that was about as much as I had told him to take?" He had heard dry salts, instead of dry sauce; had covered the quinin up in the salts and made her get it down as best she could. I don't know what happened to him, after I left, but I hoped she would feel that I had innocently handed her a part of what she was entitled to.

From some place in the past, there is still being transmitted to human beings, a love for the mysterious. The climax of the mysterious, is the miracle. Which though, was first, the love for the mysterious, or the presence of the alleged miraculous? Which was first, the aberration, or the apparition? Which was first, the demand, or the supply? Whatever the answer, the grip of this thing—the grip of superstitious inheritance is the last ignoble ancestral impulse to let go of us.

PSYCHO-THERAPY.

The other name for the miraculous is, as has just been stated, mental vacuity. The other name for the miracle, is delusion. Mental ineptness is, as a matter of course, convincingly satisfied with hallucination. Indeed, can only be satisfied, in this way. There can not for very long, be a love for the miraculous, without the

spontaneous creation of a corresponding miracle. On the other hand, a miracle presupposes the existence of the miraculous. Of the two, mental vacuity and hallucination, hallucination has more initiative. Has more sense, so to speak. If 500 people were to move into an entirely new country, both the vacuity and the hallucination would be found to have moved in with the crowd. Which was first?—would still be unanswered. I am trying to get at, and analyze, and interpret the things of forty years ago. Now, necessarily, the hallucination, or the hallucination representative is a psychologist. The delusion, to be of any practical use, must be made to fill the void in the mental. That's psychology. When I was young, I knew a woman psychologist. Also, she was a therapist. She was two in one. And she was a good one. She was the very essence of psychology. As a therapist, she was at least forty years ahead of her time. She was not Freudianism, but she was the psychic entity that Freudianism is talking about. She treated more patients than I did. I came to know that if one of my patients lived long enough, the patient was sure to fall into her care. "Flesh Decay," was her one and only diagnosis. After the diagnosis, "She Said Words." "Words," was the treatment. She made no psychanalyses. Psychoanalysis was not necessary. She was at the bottom of things to begin with. No one who heard her "say words," ever knew what the "words" meant. She said she didn't know. But it seemed to the people, that her terminology was what did it. At any rate, her terminology was unanswerable. And unanswerable terminology, is the *materia medica* of psycho-therapy.

CORRESPONDENCE.

GAS AND OXYGEN ANESTHESIA IS THEORETICALLY AND CLINICALLY THE SAFEST OF GENERAL ANESTHETICS.

To the Editor of the INTERSTATE MEDICAL JOURNAL:

Dr. J. F. Baldwin of Columbus, Ohio, has written a number of articles condemning gas oxygen anesthesia. It seems that an article I published in the *Medical Record* of January 13, 1917, has been more or less of an inspiration for his writings. In this article I advanced scientific data to show why this anesthetic was the safest of all anesthetics. I reported the findings of some of the most prominent investigators in the medical world. They say that gas oxygen is free from poisonous after effects upon the blood or tissues, of the body. These same investigators hold that ether is a blood poison, in that it very materially diminishes the number of red corpuscles the change in the configuration of the erythrocytes plainly indicating the destructive action.

My patients in the clinic leave the table fully conscious and free from nausea as a rule. At times we have some nausea, which we attribute to the preliminary hypodermic of morphine; this, however, is quickly controlled. These patients are given all the water they want immediately. They can also have nourishment, if this is compatible with the operative work.

It is quite well known that surgical trauma dehydrates the tissues, hence the thirst following an operation. We also know that starvation promotes acidosis. This is a condition we are very anxious to avoid, especially in close-risk surgery.

Contrast the above treatment of the gas patient with that of the ether patient, who is burning up for water and is so sick that he cannot retain it, even though he gets it. Who ever heard of an ether patient getting nourishment within an hour after his return to bed?

It seems to me that Dr. Baldwin is either prejudiced, or that these few deaths he has the reports of, are affecting his judgment out of all proportion to their bearing on the point at issue. In the first place, part of them could have resulted from over anesthetisation. He will have to admit that any anesthetic is capable of causing death from a too concentrated action, and especially is this possible when we stop to realise that symptoms under this anesthetic are entirely different from those under the other anesthetics; in fact, a patient can be very near death and the anesthetist or surgeon who has not had a good deal of experience with gas would think that they were in good anesthetic condition.

The above being true, one can readily see that no one but an experienced gas-oxygen anesthetist is in a position to state positively that a death, such as he mentions, was due to a toxic action and not due to faulty handling of the anesthetic.

To illustrate, I just now returned from the hospital where I gave gas for a laparotomy. The patient was a woman weighing about ninety pounds with rapid heart action and very weak and emaciated. She was put to sleep with about one-half the amount of anesthetic usually necessary for patients of her type and, despite the fact that I gave her a large percentage of oxygen and

that her color was good all the time, I found it necessary to remove the mask and let her breathe air and rest, so to speak, every three or four minutes. The respirations were very shallow and did not improve until she had been under for one-half hour. She recovered consciousness just as the dressings were strapped down and looked brighter and in better condition than when put on the table. This was a case that was very susceptible to gas and would have been lost had she not been watched every second.

I can not help but feel that part of Dr. Baldwin's prejudice is due to the fact that he has not had the opportunity to witness a perfect gas anesthesia and note the postoperative comfort of the patient. However, it is possible for him to do so, for there are two experts that I know of in his own state. They are Dr. C. K. Teter of Cleveland and Dr. E. I. McKesson of Toledo, Ohio.

These men did not acquire their skill with this anesthetic in a few weeks, or even a year, and yet surgeons who condemn this anesthetic, as a rule, are ones who have not had the benefit of working under gas anesthetic conditions such as these men are capable of inducing and maintaining. I have heard a number criticising it in one way or another and, upon asking them who was administering the anesthetic, invariably found that they were anesthetists that had practically no experience with gas; but were considered proficient because of their efficiency with chloroform and ether. I would then ask them if they had ever heard of or seen such conditions when I was giving gas oxygen, and if they had stopped to consider whether or not the anesthetic was to be blamed, or the way in which it was administered.

I ran across an article in the *American Journal of Surgery*, October, 1916, entitled 'Team Work' by Dr. C. W. Moots, a surgeon of Toledo, Ohio. He uses Dr. McKesson as his anesthetist for gas. He says, "I have read articles written by very prominent surgeons in which were the following conclusions: 'Nitrous-oxide-oxygen should be limited to very short cases'; or 'It should be used only in minor surgery'; or, 'That it can not be used in major'; or it is 'Good for hazardous risks.' Five years ago these statements irritated me; today they simply cause me to feel sorry that men whose words carry such great influence will flash before our great profession *such false statements* relative to such an important subject."

In speaking of his experience with ether, he says: "We relied almost entirely upon ether as a general anesthetic, as that agent practically settled the question of immediate mortality. There were certain things occurring, however, which we felt should be prevented. The awful nausea, sometimes lasting for days, seemed unnecessary; the functions of many organs were interfered with, as proven by laboratory findings; delayed deaths occurred, the cause of which we could not conscientiously attribute to surgical traumatism alone. The symptoms shown in many of these cases are now grouped under the term acidosis. We are thoroughly convinced that, if many of the cases did not die of *acidosis*, they at least died *with acidosis*, and that one of the etiological factors was the anesthetic. At any rate since routinely using gas anesthesia, we escape our former mortality and morbidity rate."

Dr. Baldwin says that we charge fancy fees for giving this anesthetic, and that we should reduce them to that of an ether anesthetic. In the first place, this is impossible, on account of the expensive apparatus required and the actual cost of the gases. In the second we feel that an expert is worthy of a decent fee, be he surgeon, pathologist, anesthetist or diagnostician.

Very few deaths can be traced to the surgery as practiced by the leading surgeons of today. They are, I believe due to the toxic after effects of chloroform and ether anesthesia. The patients at times do not have sufficient resisting power or strength, to overcome the traumatism of the operative procedure and to throw off the toxic aftereffects of these anesthetics.

In view of the fact that prominent investigators have been able to demonstrate that chloroform and ether have a decided toxic aftereffect upon blood and tissues, and that nitrous-oxide-oxygen is *nontoxic* and is quickly eliminated; I fail to see how we can attribute a death on the table under gas to the anesthetic if the patient was in condition to stand an operation.

I also fail to see how Dr. Baldwin can consider a toxic anesthetic safer than one which is nontoxic when both are administered correctly.

It is admitted that it is very difficult to thoroughly master a gas-oxygen technic that will enable one to obtain relaxation for laparotomies, but it can be done. When we stop to consider that it is pleasant for the patient to take, and that it can induce unconsciousness in one minute and that the patient awakens from a deep anesthesia in two to three minutes, without a possibility of any toxic aftereffects, I think you will agree that it is very necessary that we give this anesthetic the time and study necessary to master its administration in the best form.

JOHN W. SEYBOLD,

Member Interstate Association of Anesthetists, Fellow of the American Association of Anesthetists.

Denver, Colo.

MISCELLANEOUS

THE ROENTGEN RAY AND THE ARMY.

At the direction of Surgeon General Gorgas a conference of Military Roentgenologists was held at Cornell Medical College, New York City, June 11-25, 1917. Major Arthur C. Christie from the Surgeon-General's office and Major P. W. Huntington from the Army Medical School represented the army. Prof. J. S. Shearer of Cornell University conducted an intensive course in Roentgen Physics.

The Surgeon General ordered this conference with a view to standardizing x-ray apparatus and courses of study in roentgenology. The instructors, who will have charge of the various schools for Military Roentgenologists, were present together with members of the Committee upon Preparedness of the American Roentgen Ray Society.

Already the following instructors have been ordered to active duty: Major A. L. Gray, Richmond School of Military Roentgenology; Major F. H. Baetjer, Baltimore School of Military Roentgenology; Major L. T. LeWald, New York School of Military Roentgenology and Capt. E. H. Skinner, Kansas City School of Military Roentgenology.

The following roentgenologists will be ordered to similar active duty as soon as their commissions are received: Dr. L. G. Cole, New York School of Military Roentgenology; Dr. A. W. George, Boston School of Military Roentgenology; Dr. E. S. Blaine, Chicago School of Military Roentgenology; Dr. W. B. Bowman, Los Angeles School of Military Roentgenology; Dr. W. F. Manges, Philadelphia School of Military Roentgenology; and Dr. G. C. Johnston, Pittsburg School of Military Roentgenology.

Officers of the Medical Reserve Corps will be assigned to these schools by the Surgeon General for course of instruction. The following data will serve to inform roentgenologists and other physicians regarding these courses:

1. If you desire to take the instruction course in military x-ray work you will proceed as follows:

- a. Write a letter to the nearest school immediately indicating your preference for this x-ray course which will probably start about July 15, 1917.

- b. Make application for a commission in the Medical Officers Reserve Corps, U. S. Army, through your most convenient recruiting medical officer.

- c. Write a letter to the Surgeon General asking to be placed upon this x-ray instruction detail at the nearest school and attach such letter to the papers which are sent in at the time you take your examination for the commission.

- d. Write a letter when you accept your commission to the instructor at the nearest x-ray school indicating your readiness for orders.

2. The following information regarding this course may serve to influence your decision:

- a. Officers taking this course will be detailed upon pay according to rank for the period of instruction.

- b. After the completion of the course the officer may be relieved of duty and return home to await orders or be attached to a base hospital unit or other post at the direction of the Surgeon General.

c. The government is going to the expense of training these selected officers as roentgenologists and will, therefore, be desirous of using them in this capacity to the greatest extent possible.

d. The length of the regular course probably will be about three months, but officers who show unusual experience in x-ray work or who become proficient before the end of the course will be certified to the Surgeon General at a shorter period. Those who show lack of adaptation or application will be relieved of this detail and assigned to other duties or discharged by order of the Surgeon General.

BOOK REVIEWS.

CEREBELLAR ABSCESS. Its Etiology, Pathology, Diagnosis, and Treatment, Including Anatomy and Physiology of the Cerebellum. By Isidore Friesner, M. D., Adjunct Professor of Otolaryngology and Assistant Aural Surgeon, Manhattan Eye, Ear, and Throat Hospital, etc., and Alfred Braun, M. D., F. A. C. S., Assistant Aural Surgeon, Manhattan Eye, Ear, and Throat Hospital, Aljunct Professor of Laryngology, New York Polyclinic, etc. With 10 full-page plates and 16 illustrations in text. New York: Paul B. Hoeber. 1916. Price, \$2.50.

This is a very convenient little book on cerebellar abscesses. The point of view of the book is that treatment of this complication is almost solely the province of the otological surgeon, because 98 percent of cerebellar abscesses are otitic in origin. Though one may disagree with this opinion, particularly as to the province of the otologist, yet the book itself is not particularly prejudiced from this point of view.

There are five chapters—Anatomy of the cerebellum, physiology, etiology, and pathology of cerebral abscesses, symptoms, prognosis, and treatment. Of these by far the most valuable are the chapters dealing with symptoms and methods of examination. The physiology and anatomy of the cerebellum contain nothing more than may be obtained in any good anatomy of the central nervous system. The pages devoted to the consideration of Bárány methods of examination are illustrated by a number of photographs which aim to make clear the various steps in the procedures. These are not particularly valuable but should be a guide to those who wish to carry out this procedure on their own account.

In the various procedures given in the chapters devoted to prognosis and treatment there is a description of an occipital exploration. It is very questionable whether the otologist, even though he be an exceptional operator, has quite the requisite training and knowledge of the anatomy of the brain to carry out this most difficult procedure.

There is a great deal of information in this little book, and in a brief space can be obtained most of the interesting information in relation to the important features of cerebellar abscesses.

ANATOMICAL NAMES, ESPECIALLY THE BASLE NOMINA ANATOMICA ("BNA"). By Albert Chauncey Eycleshymer, B. S., Ph. D., M. D., Head of Department of Anatomy, University of Illinois. Assisted by Daniel Martin Schoemaker, B. S., M. D., Professor of Anatomy, St. Louis University. With biographical sketches, by Roy Lee Moodie, A. B., Ph. D., Assistant Professor of Anatomy, University of Illinois. New York: Wm. Wood & Co. Price, \$4.50.

The authors of this volume doubtlessly will look for adequate critical reviews only in the pages of those journals devoted especially to anatomy. Quite certain it is that only the trained anatomist is able to properly appreciate and evaluate the enormous amount of work contained between the two covers. This much is certain, however, that any well-equipped clinician will almost instinctively sense the fact that this volume is painstaking and scholarly to the last degree. Furthermore, the clinical showing any interest in medical history will welcome the short, accurate, and succinct notations in the chapter devoted to biographical sketches, written by Roy L. Moodie.

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EDITORIAL.

DIAGNOSTICS AND IDENTIFICATION.

An interesting note from the pen of Prof. Thorold Sollmann, in a recent number of the *Journal of the American Medical Association*, deals in a characteristically fair manner with the relative values of clinical and of laboratory evidence. In sum, he states that, though ultimately the status of any remedy must be rested on clinical evidence, the latter from its very nature calls for the closest kind of scrutiny.

The same truth is applicable to diagnostics. It is so easy for a man to make the same mistake a thousand times and call it experience.

In practical criminology there is a frequently recurring problem whose parallelism with the above is truly remarkable. I refer to the two ways by which identity is established. The one depends on ordinary unmethodical recognition; the other on the scientific *signalement*.

For every-day purposes we are obliged to have recourse to the faculty, more or less developed in all of us, of recognizing persons. This faculty is not often based on any conscious analysis, for experiment has shown that, even among those who possess it in the highest degree, many are unable to answer, correctly, simple questions relative to points of identification, such as the presence or absence of face hair, color of a person's eyes, etc. Nevertheless, the error in practice is small, when expressed in percentages. It is, however, a type of error which sometimes gives rise to grave injustice. It is characteristic of this kind of identification that, owing to the absence of any conscious analysis of the elements of identity, the identifier is devoid of the faculty of criticising the value of his identification.

On the other hand, we have the various processes of scientific identification now so extensively used by the police forces of the world. These are based on three fundamental systems: first, the Bertillon anthropometric record; secondly, finger prints, and thirdly, the "word-portrait" (*Le portrait parlé*).

The first of these is moribund, having for all practical purposes been replaced by a combination of the other two. The credit for the practical application and development of finger prints, as a means of identification, is unquestionably due to Henry and Galton, previously to whose work they were of little or no value. The third method, the "word-portrait," like the first, we owe to Bertillon and it is the only specific part of his work that will survive.

Now, in contrasting the use of these two methods, we shall find that the ordinary recognition method is the only one that is available most of the time. The other can only be employed on certain specified cases. The value of the two methods, therefore, depends upon the circumstances. In the hands of an expert the *signalement* is practically infallible, but its applications are limited.

Now, a person may be almost devoid of the faculty of ordinary recognition; this is, indeed, the case with myself. Yet such a person, properly trained, can identify, with a precision approaching the absolute, a man with whose word "word-portrait" he is familiar, notwithstanding the heaviest disguise. On the other hand, it is impossible for him, when using this method, to confuse the identity of two persons, even if they resemble one another (in the ordinary sense of the term) so strongly that their friends are unable to distinguish them apart.

The basis of the word-portrait is that which underlies all Bertillon's work. This French savant's real and permanent contribution to criminology was the introduction of method, that is, of science into identification, altogether apart from any specific system with which his name may be associated.

The characteristic of the particular method is that every element of identification is taken in a given order, and the description of it is made in accordance with a standard glossary. Each element of this description has three quantitative factors. For example, if in the standard description a particular feature falls into the "long" class, if the feature has the length of an average long one of its kind, the word stands in its simplest form—long. If it is very long, the word is underlined—long. If it is only somewhat long, the word is placed between brackets (*long*).

The index to the album of "portraits" is divided into three primary headings by the shape of the nose, into six secondary headings by the primary characteristics of the ear; thus giving immediately forty-two great divisions of profiles. By the use of other characteristics, the place where a suspect's description may be found

is narrowed down to a group containing a small number, in which the differentiation leading to the final identification is effected by "peculiarities."

It will be seen how very different this process is from that by which we ordinarily seek to recognize our acquaintances, how immensely more precise the identification becomes.

The difference is just that between the "off the hip" routine diagnosis of the old-fashioned physician and the diagnostic methods of a modern clinic.

Between the two comes the practice of the average up-to-date physician.

THE SYNOD OF NEW YORK OR SCIENCE BY BALLOT.

The reproach that has long lain on our profession of unwillingness to accept methods originating without its ranks has been raised by the courageous action of the House of Delegates of the American Medical Association.

That august assembly has assumed for the profession, in their plenitude, the functions performed for the Church by an Ecumenical Council.

All other considerations set aside—as French judgments are wont to recite—including such trifles as the contrary opinions of pharmacologists and therapists, and the manifest incompetence of the assembly itself, the House has, by decree, erected what was hitherto held by some of us as a Pious Opinion, into a Dogma, necessary to medical salvation. Alcohol, according to this decision, has no value as a food, is useless in therapeutics, and is detrimental as a medicine.

Our frivolous and mocking generation is unlikely to let us forget the historical fact that such decisions, when promulgated in decrees, were known as Bulls.

* * *

It will not escape you what a useful general method for the solution of scientific problems has thus been consecrated.

By a careful selection of the body before whom to submit it, the answer to any vexed scientific question may be obtained by the simple process of counting votes.

What should be the method adopted in choosing the advisory body to the Assembly is clearly indicated in our leading case.

Instead of referring the question of alcohol as a food and as a drug to the Council on Pharmacy and Chemistry, which, being composed of pharmacologists, therapists, and chemists, would be fully aware of the difficulty of the problem and, therefore, might be reluctant to emit a dogmatic opinion, the matter was submitted to the Council on Public Health.

From this a general rule may be derived for future guidance: Of all possible consultative bodies eliminate any who, by their composition, may be supposed to have expert knowledge of the matter in question and, having done this, submit the problem to any one of the others, chosen, preferably, by lot.

In this way will be economized the present heavy and ever increasing expenditure on scientific research. Only enough of the latter need be carried on to raise questions to set before the council.

* * *

But, just as the decrees of the church ever encountered the opposition of fanatical schismatics, so this latest august pronouncement has not escaped attack.

Dr. Hare, a mere therapist and physician, with a temerity not usually associated with his namesake, has entered a vigorous protest both against the competence of the House of Delegates and against the Edict itself.

He has aggravated his offence by bringing evidence, in support of his contention, even from out the sacred fane itself, for he quotes members of the Council on Pharmacy and Chemistry.

The Secretary of the Council on Health and Public Instruction, Dr. Green—another contradiction in nomenclature—has made the official reply. No one who knows him will expect Dr. Green to be so imprudent as to walk into the parlor of scientific controversy, whose door is so temptingly held open by Dr. Hare. The Secretary of the Council contents himself with a defense of the competence of the latter considered purely from the point of view of procedure, followed by some remarks on the subject of malpractice and on the law of evidence.

* * *

With regard to part of Dr. Green's statements on the law of evidence and pleading, I am feign to admit that I read it with some surprise and incredulity. After stating that the resolution of the House of Delegates could not be put in evidence, he says that *it could be introduced into argument* but that the jury would attach what weight they thought fit to it. I take it that he means that it could legally and properly be introduced into argument. Such a ruling would be contrary to the practice prevailing under the Common Law and I am advised that it would be equally contrary to the practice in this country, and that, were the objections of counsel to such admission in argument overruled, the decision inevitably would be reversed on appeal. It is, indeed, difficult to imagine how any other rule could prevail. Were it otherwise, the result would be most unfortunate, and much more so than if the resolution could be put in evidence. In the latter case, it would be shown not to be the opinion of persons especially competent. It could be proved that it was not unanimous, and that it was contrary to the ex-

pressed opinions of many, if not of most, of those who have made a special study of the subject. But, if offered in argument, even where the right of reply was available, it would act on the minds of a lay jury as the authoritative opinion of a body of scientific professional men, against which they would only have the assertion of an interested lawyer.

MILK BOTTLE CAPS.

We are promised, at an early date, some substitute for the present glass bottle in which pasteurized milk is delivered. Until, however, this ideal is realized, it will be well that the pasteurization of milk should not be nullified by the nature of the cap with which the bottle is closed. The cap should be of such a kind that it can be removed without serious risk of contaminating the contents of the bottle.

This elementary requirement is rarely fulfilled. Some of the largest dealers, in the city of Chicago at any rate, send out their pasteurized milk with a plain circular disk as a cap. This disk cannot be removed, in the majority of cases, without producing contact between the milk and the outer surface of the cap. Now, this outer surface is often wet with milk, and still more often soiled from the hands of the milkman, or in some other way. A single- or double-tabbed cap is free or almost free from this objection. The risk that the bottle may be surreptitiously opened, after sealing and before delivery, is insignificant in comparison with that of serious contamination such as results from the use of an untabbed cap. If tabbed caps are not to be used, it will be well to minimize the risk by not filling the bottles so completely as it is the present practice to do.

It is alleged that mechanical difficulties stand in the way of using tabbed caps, and that the use of larger bottles incompletely filled would meet with opposition from housewives. One is skeptical about the former objection; the latter objection could be met by a health ordinance.

THE OLDEST WRITTEN WORD.

How many, if asked what is the oldest written word found in an extant document and still in use—not, mark you, the oldest root—could answer correctly? And yet the word is one appearing frequently in our advertising columns, and it is the name of a therapeutic agent and toilet article in common use.

In the office copies of the letters and instructions given to the envoys of the heretic king of Egypt, Akhenaton (Amenophis IV.), in the fourteenth century B. C., which office copies were discovered

at Tel-el-Amarna, there occurs a passage which was read as follows: "We hope that the Salc will not interfere with you."

It was taken for granted that "Sale" was the name of some war-like tribe in the hills of northern Syria; but it was remarkable that a tribe, powerful enough to brave the wrath of such great monarchs as those between whom this correspondence was passing, should not be mentioned in any other of the voluminous records of those times.

Pondering this, a philologist remembered that S, Th, and T were interchangeable, especially in Semitic languages. For example, the name that we, imitating the northern Semitic races and the Turks, call Osman is spelt and in southern Arabia is pronounced *Othman*, while the Empire of Osman is known to Europeans as the *Ottoman* Empire. Now, there exists in the Semitic languages a word for ice or snow which, in various places, takes the sound of thalg, salg, and talc.

The mystery was thus cleared up. The envoys had to pass the mountains of northern Syria in winter, and their august master expressed a hope that the ice or snow would not interfere with their passage. The Egyptians, having no acquaintance with ice or snow, would naturally borrow the name from their northern neighbors.

When the Arabs desired to give a name to the foliaceous magnesium silicate, they chose one which suggested its resemblance to ice, and they called it *talc*.

COLLECTIVE ABSTRACTS

GASTRIC AND DUODENAL ULCER.

BY MAJOR G. SEELIG, M. D., of the Editorial Staff.

In March of this year there appeared in the *International Abstract of Surgery* a collective review of the subject of gastric and duodenal ulcer by R. C. Coffey. This review was so fundamentally thorough that, could one be sure it would come under the eyes of all readers, there would be no call for further resume of the subject at this time. It is probably worth while, however, to restate, in shorter compass, the important conclusions worked out by Coffey, for the information of those whose effort does not lie exclusively in the field of surgery.

The frequency of occurrence of gastric and duodenal ulcers varies with the statistics of various investigators; Weir's report, covering nearly 46,000 autopsies, shows a 1 percent incidence of gastric ulcer and about a $\frac{1}{4}$ percent incidence of duodenal ulcer. These percentages agree with those established by Wille. Gruber, on the other hand, found gastric ulcer in 4 percent of autopsies.

The age incidence varies also with the particular experience of various reporters. Weir quotes Collins' statistics to the effect that in 297 cases of duodenal ulcer, the disease occurred 42 times in the first decade, 24 times in the second decade, 42 times in the third decade, 52 in the fourth, 46 times in the fifth, 41 times in the sixth, and 8 times in the seventh and eighth decades. Eusterman reports from the Mayo Clinic that the average age of patients presenting themselves with gastric ulcer was 36 years. Coffey calls attention to the fact that we are slowly coming to know that peptic ulcer is not an uncommon disease of later life, and also that our former notion regarding the predilection of the disease for females is incorrect. In Coffey's own statistics, of 150 patients 86 were males, and 64 females. As regards location of ulcer, Coffey accepts Welch's post-mortem statistics as being in practical agreement with operating room findings. Welch's figures, covering 793 autopsies, are as follows: 235 cases of ulcer on posterior wall, 288 on lesser curvature, 96 on anterior wall, 95 in the pyloric ring, 27 in the fundus, 27 along the greater curvature. In looking up the statistics covering the location of duodenal ulcer, I find that even more than the 95 percent stated by Coffey occur in the first part of the duodenum. George and Leonard in their book on "The Roentgen Diagnosis of Surgical Lesions of the Gastrointestinal Tract," state that whenever they determine the first part of the duodenum to be normal, they furnish a negative diagnosis regarding the existence of duodenal ulcer.

Regarding the etiology of peptic ulcer, it is rather a fruitless effort to restate at length the various hypotheses that have been framed to meet the problem. The essential fact of the matter is that none of the theories stand as proved. The discriminating surgeon of to-day finds himself more or less forced to lend not a little weight to the belief that focal disease is responsible for many cases of peptic ulcer. It seems to be important to be able to tell whether the focus is in the gallbladder or appendix, as Moynihan claims it so often is, or whether the focus is a cryptic or patent streptococcal lesion situated else-

where. Rosenow is responsible for this latter dictum, and Coffey does well to quote him at length. Rosenow says: "Intravenous injection of streptococci of the proper grade of virulence may be followed by ulcer of the stomach and duodenum. The ulceration is due to a localized infection and secondary digestion. The ulcers are usually single and deep, with a marked tendency to hemorrhage and perforation, and resemble the human gastric ulcer in many respects. When we take into consideration this close resemblance, that injection of streptococci which have grown in tonsils produce the lesion, and the virulence of the germs when the affinity for the stomach is greatest is of such character that a general infection does not occur, it appears altogether reasonable to suppose that in man gastric ulcer may be caused by streptococci also. The supposed relation between the infected tonsils or gums and gastric ulcer may be due, not to the swallowing of bacteria, as usually supposed, but to the entrance into the blood of streptococci of the proper kind of virulence to produce local infection in the wall of the stomach. Many other observations may be cited, such as associated infections of the gallbladder and appendix, which suggest that gastric ulcer may be due to streptococci." In the eighth volume of "Collected Papers" from the Mayo Clinic, Rosenow states his views in detail.

It is practically impossible for anyone of experience to discuss the subject of diagnosis of gastric ulcer with the idea of any definite diagnostic scheme in view. The cardinal symptoms of pain, vomiting, hematemesis and stagnation still stand, but must be interpreted with great care for detail, and even then we find ourselves usually placing most reliance on the type of pain complained of by the patient. The pronounced advance made in the field of x-ray diagnosis offers much aid and will be discussed later. Coffey selects as most clearly descriptive of the symptomatology of gastric ulcer, the following statement of D. Roberts: The typical ulcer pain develops from half an hour to two hours after eating, and develops gradually, is burning, boring, cutting or stabbing; is localized in the middle line, close to the ensiform cartilage, possibly radiating to the back of the precordium; is regular in occurrence and is induced principally by solid foods, and rarely by water; it lasts for some time and is often terminated only by vomiting, ingestion of alkalies, or albuminous foods. The tenderness is pronounced, and is sharply localized over a small area in the middle line between the ensiform cartilage and a point midway down to the umbilicus. Vomiting is not at all essential to the clinical picture. Actual hematemesis, taken with these symptoms is almost absolutely diagnostic. Hyperchlorhydria is not rarely found; it is contributory evidence, but it does not rule out carcinoma. In gastric ulcer hypersecretion is even a more constant finding than hyperchlorhydria.

Regarding the diagnosis of duodenal ulcer, the classical description of Moynihan represents an authoritatively confirmed opinion. Coffey enthusiastically advises every physician to have this description framed and hung in the office: "The patient tells you that he has certain definite attacks; and if you take the history given in detail, letting the man tell his own story, he will give you the impression of having read something which has been written about duodenal ulcer which he is recounting to the best of his ability to please you. He says that his trouble comes on in attacks which are nearly always worse in winter than in summer and are very apt to be precipitated by a chill. Let us follow the patient through the day. He takes a meal at eight in the morning, and from two to two and a half hours afterward he is fairly comfortable; it is his best time. At the end of that time he has a feeling of discomfort in the epigastrium; he feels full and heavy, and may get some relief from the belching of gas. Some of these patients develop a habit of belching. They may bring up a very sour fluid, which tastes very bitter and

acid, and makes the mouth dry and the teeth chalky. This pain gradually increases until the next meal comes. To this I some years ago applied the term of 'hungry pain.' At the next meal the patient almost instantly gets relief, and that relief persists for two or three hours again. He probably eats a heavy dinner, and he will nearly always tell you he has something before he gets into bed; a glass of milk or a cup of cocoa and a biscuit. He sleeps comfortably until he wakes about 2 a. m. He gets relief from nibbling a biscuit which he keeps at the bedside. The pain is found to be most relievable by something stodgy and indigestible. Taking an alkali relieves the pain; so will emptying the stomach by washing it out. If these symptoms which I have described are recurrent, you can diagnose duodenal ulcer."

Much of this description depends, of course, upon so-called subjective symptoms, as does also the diagnosis of gastric ulcer. Subjective symptoms are so notoriously misleading that we should be left in the lurch very frequently, were it not for the corroborative aid of the x-ray. Carman, of Rochester, Cole of New York, Mills of St. Louis, Case of Battle Creek, and George and Leonard of Boston deserve much credit for the patience with which they have worked out the details of x-ray diagnosis of gastric and duodenal disease. The recently issued volume by Carman and Miller brings this subject practically up to date. With views changing as they do, and with ulcer subjects coming to the surgeon usually after they have been through the hands of internist and roentgenologist, it makes it fairly difficult for the surgeon to set up his own independent standards of x-ray diagnosis. Coffey restates from Carman, the eight roentgenoscopic characteristics of gastric and duodenal ulcer as follows:—For gastric ulcer:

1. Diverticulum of perforating ulcer.
2. Visualization of bismuth-filled crater of a callous ulcer.
3. The incisura, or transverse contracture, indenting the greater curvature.
4. Localized pressure tender-point on lesser curvature.
5. Residue after six hours.
6. Acute fish-hook form of the stomach, with displacement to the left and down.
7. Delayed opening of the pylorus.
8. The settling of the bismuth to the lower pole of the stomach, such as is seen in hypertonicity or atony.

For duodenal ulcer:

1. Early, free opening of the pylorus, with early clearing of the stomach.
2. Lagging of bismuth in the duodenum.
3. Residue in the stomach after six hours.
4. Pressure tender-point over the duodenum.
5. Dilatation of the cap.
6. Irregular outline of the cap or duodenum.
7. Diverticulum of a perforating ulcer.
8. Vigorous peristalsis, especially if there is obstruction.

Nothing mirrors more accurately the reliance which may be placed upon x-ray diagnosis than the statement made by George in his book already quoted. George places his correct positive diagnosis at over 80 percent and his correct negative diagnoses in duodenal ulcer (150 cases) at 100 percent. Unfortunately, success of so high a grade suggests an unusual degree of interpretative skill.

There are four essential complications of gastric and duodenal ulcer that call for especial mention: progressive loss of weight, perforation of the ulcer, acute hemorrhage, and the development of cancer on an ulcer base. The first complication, loss of weight, calls for no special comment, for it is merely consequent upon the vomiting that results either from pain and reflex pylorospasm

or from organic pyloric obstruction following cicatrization. Of all the complications it is the one that responds most readily to proper surgical therapy.

Perforation is not only an acute complication, but also one of the gravest of intraabdominal lesions. Perforation manifests itself as an acute abdominal crisis, attended by the classical symptoms of acute peritonitis, ushered in usually by evidences of surgical shock. Moynihan calls attention to the so-called subacute perforations, in which the perforation is so small that the peritoneal cavity is not suddenly overwhelmed and is able to build up a barrier of adhesions. These patients present also the clinical signs of an acute peritonitis, the acuity of which is however less marked than in the case of large, sudden, acute perforations. In my own experience, many of these cases present a confusing similarity to acute appendicitis, a fact which seems to be due to right iliac fossa inflammation from the irritative gastric contents which gravitate into this location.

The mortality from gastric or duodenal perforation, which is now estimated by Coffey to be about 50 percent, has fortunately lessened in the past decade, as surgeons have become more familiar with the signs and symptoms of this accident. It is preeminently true, that the mortality attendant upon perforation varies directly with the length of time elapsing between perforation and operative treatment. The figures of Petren represent the general experience. Petren reports 135 cases of perforation, with 60 percent mortality. Those operated upon during the first 12 hours showed a 44 percent mortality, whereas those operated upon during the second 12 hours showed a 57 percent mortality. Mayo Robson reports a total mortality of 66 percent with a mortality of only 37.7 percent in those cases operated upon in the first 24 hours. The two most interesting sets of statistics quoted by Coffey are those of Deaver and Sullivan. Out of 26 cases Deaver saved 25, but all of them were operated upon within the first 24 hours. The twenty-sixth case was operated upon twenty-nine hours after perforation. Sullivan lost only one case in 20; all of the cases were operated upon within 14 hours after the perforation. The patient that died was the one in whose case the longest time of interval had elapsed between perforation and operation.

Regarding the exact type of operative therapy that should be practised on these patients, there is some difference of opinion. This difference of opinion, however, centers chiefly around two points—namely, the performance of gastroenterostomy, and the use of drainage.

The commonly accepted principle is that perforating ulcer is best treated by closing the perforation, and instituting proper peritoneal drainage as for any other type of acute peritonitis. Many surgeons advise dispensing with drainage in those cases which are operated upon very early after perforation. Considering the practical impossibility of drainage doing any harm, one naturally finds himself loath to omit this procedure. Deaver advocates most emphatically the wisdom of performing gastroenterostomy after closure of the ulcer is completed. The wisdom of this advice has been called sharply into question, and Deaver holds the position of a strong minority.

A word should be said regarding the occasional almost insuperable difficulty of closing a perforation. If the ulcer has a large callous base, infiltrated with inflammatory exudate, the stitches cut their way out, even if tied over so gently. This difficulty is usually met by infolding a broad area of stomach wall, or by the less satisfactory method of plugging the perforation with omentum. In one case, successfully operated upon, I was obliged, in the face of a very acute perforative peritonitis, to resect the pylorus.

The question of cancer as a complicating feature of ulcer is secondary in importance to perforation only because it is not possible to demonstrate an indisputable causal relation between ulcer and cancer. The well known

Rodman operation of pyloric resection for pyloric ulcers was based on the assumption that cancer frequently develops on an ulcer base. This position taken by Rodman is upheld by workers of the Mayo Clinic, who even go so far as to state that cancer of the stomach rarely develops except on the base of a previous ulcer. A survey of the literature furnishes most confusingly conflicting data on this point. Lockwood was able to elicit an ulcer history in only 3 percent of his cancer patients. Payr found microscopic evidence of cancer in 25 percent of his resected callous ulcers, Kuttner's figures covering similar data are 43 percent, whereas Kocher and Patterson report that in only 3 percent of the gastroenterostomies for simple ulcer was there a subsequent development of cancer. Coffey takes the stand that "there is a heavy burden of proof on the advocates of the theory that cancer usually develops on an ulcer base, to show that the precancerous ulcer was not really cancer from the start."

On broad general lines, we are forced to assume a possible relation between ulcer and cancer, but we are more strongly forced to keep always in mind the fact that a definite relation between ulcer and cancer has not been proved.

Regarding the subject of hemorrhage as a complication, little need be said, save to emphasize the fact that urgent bleeding from an ulcer never calls for the institution of surgical therapy. Considering how massive some of these sudden hemorrhages are, it is remarkable how few fatalities result from them. It is this truth which should stay the hand of the surgeon. One can count on cessation of hemorrhage as a rule if the stomach be placed at absolute rest, the patient maintained absolutely quiet in a recumbent position, and every possible blood pressure raising factor eliminated.

It may be conceded as a generally accepted fact that the typical surgical procedure for the treatment of gastric and duodenal ulcer is posterior no loop gastroenterostomy, performed as a rule with clamps, and by means of suture instead of button or other mechanical appliance. During the past few years there has developed a strong tendency to use catgut for suture material, to the exclusion of nonabsorbable sutures. The reason for this is that more or less post-operative difficulty has resulted from nonabsorbable continuous sutures hanging in the stoma, and causing partial or even complete blockage of it. Furthermore, this type of suture is supposed to predispose to new ulcer formation. There is no longer any argument regarding the length of the loop or the direction of the jejunum. The operation is practically always done without a loop and the jejunum is applied to the stomach so that the intestine courses either downward and to the left, or directly downward. On this point it may be stated, however, that many surgeons of experience claim that vicious circle is not dependent upon the direction of the jejunum and will, as a rule, not occur if the stoma is made at the low point of the stomach, and the intestine not twisted on its axis.

Under certain conditions, such, for example, as obliteration of the lesser peritoneal sac by adhesions, it may be technically impossible to perform posterior gastroenterostomy. In such cases anterior gastroenterostomy is performed. If the precaution is taken to attach the jejunum over a broad surface of the anterior wall of the stomach, this type of operation may render excellent service in spite of its physical and mechanical imperfections. The chief pitfall to guard against is that of the jejunum hanging only from the stoma. Such a position is very apt to lead to kinking, but it is fairly simply guarded against by attaching the jejunum throughout its length of contact with the stomach by means of Lembert sutures.

About five years ago, many surgeons were inclined to attribute a percentage of the undesirable postoperative complications to the fact that, after gastro-

enterostomy the stomach had two exits instead of one. On this basis many attempts were made to devise a satisfactory method of closing the pylorus. It was infolded by continuous suture, tied off with tape or fascial bands, or with the round ligament of the liver, or even divided between clamps, and each end sewed up and then inverted. After sufficient time had elapsed to try out these various methods, it was found that the simpler ligations furnished practically no advantage, and that the major procedures were attended with too much risk, and even when the operative mortality attending them was not heightened, the expected clinical results were not forthcoming.

One other operative modification that was practised rather extensively for a few years, and is still practised by a fairly large number of surgeons is resection of the offending ulcer. At first, simple resection of the ulcer with closure of the defect in the gastric wall was all that was done. After sufficient time elapsed to study these cases adequately, it was found that the deformity of the stomach consequent upon the resection, was responsible for much postoperative trouble. This was particularly true of resection of ulcers located on or near the lesser curvature. Experiences of this sort eventually led to the dictum that when ulcers are resected, the resection should be accompanied by gastroenterostomy. At the present time the tendency seems to be strongly in the direction of limiting surgical therapy to simple gastroenterostomy. This tendency is clearly mirrored in the following quotation from Coffey's article:—

"The operations for excision of ulcers have also been disappointing. The danger of an excision operation plus gastroenterostomy is very much greater than simple gastroenterostomy, and, what is more, the ultimate results are not so good as where the ulcer has not been excised (see Balfour's article, *Transactions Western Surgical Society*, 1916) as a very large percent of conservative surgeons now concede. The von Eiselsberg exclusion operation not only adds much to the danger of gastroenterostomy so far as immediate mortality is concerned, but also undoubtedly adds a predisposing element to secondary post-operative peptic ulcers. The Mayo transgastric excision operation is occasionally indicated. The Balfour cautery operation will probably have an increasing usefulness."

No small amount of interest attaches itself to the fact that even granting the correctness of the almost universally conceded efficacy of gastroenterostomy, the operation nevertheless rests largely on an empirical basis. Practically nothing can be added to the discussion of the *modus operandi* of cure of ulcer by gastroenterostomy furnished by Coffey:—

"We have had the opportunity," says Coffey, "in doing the two-stage operation for ulcer, in at least a half dozen instances of seeing a very angry indurated ulcer almost entirely disappear within three weeks after the gastroenterostomy. A very decided influence has been exercised by something on the ulcer. Is the relief produced by reducing the acidity of the stomach contents which come in contact with the ulcer, or by allowing the easy emptying of the stomach and reducing the spasm in that way? In other words, is the problem a mechanical or a chemical one?"

"There is certainly a great deal of evidence that it is both mechanical and chemical. Admitting this, and admitting the correctness of Paterson's statement that the average reduction of acidity after gastroenterostomy is 30 percent, the next question is, how is the reduction brought about? Is it due to the inflow of bile into the stomach, or to the more rapid emptying of the acid stomach contents? At first thought it seems that it would make little or no difference as to how the reduction in acidity might be brought about. On second thought, however, there is a difference, for if it is simply a question of letting bile into the stomach in accordance with a theory that the contact of bile, which dilutes the gastric juice, heals or relieves the ulcer by reducing

the acidity, not only is there no need for obstructing the pylorus artificially after a gastroenterostomy, but it is even highly desirable that the pylorus be allowed to remain open; while, on the other hand, if the operation is purely for drainage, obstruction would be highly desirable in duodenal ulcers, in that it would keep the acid contents from coming in contact with the ulcer at all.

"It is conceded by all that the greater the obstruction of the pylorus at the time of operation the better and surer the results would be. This fact has led to a great many methods of artificially obstructing the pylorus, but I think that all who have compared several cases in which permanent obstruction was tried with an equal number of unobstructed cases, will agree that the unobstructed cases do quite as well as the obstructed ones, if not better. Here, again, it seems quite probable that the reduction in acidity is brought about both by more rapid emptying and by the inflow of bile into the stomach, thus diluting its contents, just as withdrawing the blood of a patient who has been asphyxiated with illuminating gas, accompanied with an infusion of an equal amount of fresh blood into the vessels of the patient, produces much better results than either the method of drawing off the asphyxiated blood or the simple infusion of a certain amount of fresh blood employed alone.

Assuming that the reduction of the acidity of the stomach contents is due to such a double process, we can harmonize our clinical results in a much better way. The Mayos, Peck, Doyen, and, in fact, the majority of the surgeons of wide experience, are inclined to lay more stress on the drainage feature. There are two or three things, however, which throw some doubt on their assertions. In the first place, the Finney operation, when done for gastric ulcer, apparently gives just as good, if not better, results than posterior gastroenterostomy. Secondly, we must consider very seriously the work of Paterson, which is very painstaking and bears the earmarks of splendid scientific work. Paterson takes the ground that the mechanical feature is unimportant and that the good results are brought about by the influx of bile. His experience is that in cases in which there is no organic stenosis of the pylorus, the evacuation is slightly accelerated. Usually the stomach is empty in from three to four hours after meals. He tests this out by the amount of food recovered an hour after a test meal. In 60 percent of a series of investigated cases the amount recovered after a test meal was less after operation than before, but the difference is not great. On the other hand, in 66 cases the amount of food recovered an hour after meals was 160 ccm. and 180 ccm. after operation. He concludes that in cases where the gastric motility was impaired, marked by pyloric stenosis or by adhesions, gastrojejunostomy results in marked improvement of evacuation of stomach contents. Paterson thinks it is immaterial whether the food leaves the stomach by the pylorus or by the stoma. He asks the question: 'How does the mechanical explanation of gastrojejunostomy explain the relief of pain in the case of gastric ulcer in the stomach on the lesser curvature or in the body?' Paterson contends that the results of gastroenterostomy in this class of cases are equally as good as those in gastroenterostomy for pyloric ulcer. He says: 'The most striking effect of gastrojejunostomy on the gastric contents is the diminution of the total acidity, 30 percent.' He contends that this diminution is due to two causes: 'To diminution of the total chloride secreted by the gastric mucosa, and to neutralization of free hydrochloric acid by bile and pancreatic juice which gain entrance to the stomach through the anastomotic opening.'

Sippy, in harmony with this alkalizing medical treatments, believes with Paterson, that the chief function of gastroenterostomy is the alkalization of the stomach contents by the bile and pancreatic juice.

In conclusion there is necessary only a word to emphasize that although there is a well established consensus of opinion that the surgical treatment

of ulcer is attended by happy results (50 percent to 75 percent of absolute cures, and 75 percent to 90 percent of satisfactory improvements, according to Coffey) surgeons should nevertheless not be unmindful of the great number of absolute cures accomplished by so-called medical treatment. Some of the more enthusiastic internists claim that better results are attained by medical non-operative, than by operative treatment. Of the various types of medical cures (and they are legion) the one which is most popular at present, or at all events, most popular in the West, is that devised by Sippy of Chicago.

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NEUROLOGICAL SURGERY.

By ERNEST SACHS, M. D., of the Editorial Staff.

In the past three months very little work of importance has appeared on neurological lines. Even the war literature on this subject is surprisingly limited, Captain J. Renfrew White, R. A. M. C., has contributed an interesting study of fifty peripheral nerve injuries in the *British Journal of Surgery* (April). This author considers in general the value of the various accepted signs and symptoms which enable a differentiation of complete and incomplete nerve lesions. Then follow, apparently, the rules laid down by Sherren in his admirable little book on "Injuries of the Nerves." He has investigated particularly the value of the four cardinal signs of a complete lesion.

A. Absolute loss of voluntary and involuntary motor power in muscles exclusively supplied by the affected nerve distal to the lesion.

B. No reaction of such muscles to faradic stimulation.

C. The typical reaction of degeneration on galvanic stimulation.

D. The full loss of sensibilities, epicritic, protopathic, and deep, over the recognized areas peculiar to each nerve.

The two last signs he finds are not consistently present. In a number of cases he finds that the typical "reaction of degeneration" does not occur as it should and that the anodal and kathodal contractions do not occur as laid down in Pfueger's law.

In regard to incomplete lesion of the nerve, he finds great variation depending on the degree of nerve injury. The following seven signs are, however, quite characteristic of incomplete lesion and usually pathognomonic:

1. The presence of sweating—often excessive—over the area of exclusive cutaneous supply.

2. The presence of shooting pains and paraesthesiae referred to the area of supply of the nerve distal to the lesion. On the other hand, the eliciting of pains or paraesthesiae referred distalwards, by pressure over the seat of nerve injury, does not necessarily mean an incomplete lesion, as these are often due to pressure over a part of the nerve just proximal to the lesion, which is the seat of an interstitial neuritis, and in such a case are analogous to those occurring on pressure over an amputation neuroma.

3. Tenderness of the nerve trunk below the lesion, or the production of paraesthesiae by pressure on the nerve below the lesion.

4. Certain trophic changes in the skin—glossiness, redness, and blisters; of course the last are not by any means pathognomonic of incompleteness.

5. Hyperalgesia of the skin exclusively supplied, without protopathic loss.

6. A patient with an incomplete division which is causing much pain frequently gets into a very emotional and hysterical condition, and will become very antagonistic at the suggestion of another sensory examination.

7. The nature of the galvanic response: Sherren has described a reaction of incomplete degeneration which sometimes occurs with an incomplete lesion. The paralyzed muscle will respond by contraction to a smaller current than on the opposite side; usually the polar reversal is absent. The diagnostic value of an absent reaction is slight.

There follows then, a detailed report of the cases. These contain many interesting plates showing sensory disturbances. The ultimate results from operative interference are but rarely recorded, which is greatly to be regretted.

William Sharpe has contributed two papers, one on "Operative Treatment of Hydrocephalus" (*American Journal of Medical Sciences*, April), and "The Pressure Signs of Certain Intracranial Conditions Observable in the Fundus of the Eye" (*Archives of Ophthalmology*, July). In the first paper, the author describes a new method of treating hydrocephalus carried out on a series of forty-one cases. The paper is a preliminary report and it is to be hoped that in a more complete article the author will give further and more evidence for some of his statements. He believes external hydrocephalus is very much more common than internal hydrocephalus, which is certainly contrary to the accepted views. The following statement would seem to justify one in questioning his definition:

"If, however, it is desired to ascertain the type of hydrocephalus before the operation, then a ventricular puncture needle can be inserted into the ventricle . . . and at the same time a spinal puncture needle is inserted into the lumbar subarachnoid space; with the patient lying upon his side, the median line of the head being upon an exact level with the spinal canal and the patient being perfectly quiet, the pressure and rate of flow of the cerebrospinal fluid from both the needles should be the same if the ventricles and subarachnoid spaces are in free communication; the condition would therefore be one of hydrocephalus externus."

This is not in accord with accepted views as expressed by Charles H. Frazier in his article on "Types of Hydrocephalus" in the *American Journal of Diseases of Children* (February, 1916). Such a case as Sharpe describes could perfectly well have an internal hydrocephalus with an absorptive defect. The objection the author makes to the types of drainage of the cerebrospinal fluid is that adhesions block the channel. It is difficult to see why adhesions should not interfere with the drainage of cerebrospinal fluid in his method as in the other types of operation. Another surprising statement the author makes in discussing operative procedures is the following: "In the early days of Hippocrates, merely lumbar punctures and ventricular punctures were performed, etc." That Hippocrates did many remarkable things we have all known, but there is no evidence to indicate that he ever attempted lumbar puncture or a ventricular puncture, though he did do trephinations. The little book by Plaut, Rehm, and Schottmuller on "Cerebrospinal Fluid" in its historical review would surely mention this fact, if such were the case. The whole history of spinal fluid according to them begins with Haller in 1766, and the first lumbar puncture was performed by Quincke in 1891.

Of the forty-one cases operated on, thirteen died, and twenty-two of the remaining twenty-eight, the author reports, improved.

In his other article, Sharpe tries to differentiate between papilloedema and choked disk, on the one hand, and optic neuritis, papillitis, and retinitis on the other. It is very timely that he should again emphasize the difference between these two types of conditions. It is a feature of neurosurgical work which has always caused much discussion and on which it is very difficult for men to agree in specific cases. His extensive use of lumbar puncture to aid in this differentiation seems to the reviewer a bit dangerous in view of the increasing number of serious complications, and even fatalities which have been recorded in the literature from its indiscriminate use.

His eye findings in cases of cerebral spastic paralysis are quite unusual. In the hands of others, changes in the eye grounds in these cases have been found extremely rarely. One wonders whether some of the changes he observes may not be physiological variations rather than pathological changes. On the other hand, he has had an unusual number of cases of this sort to study—nine hundred and fifty-four, of which he operated two hundred and nineteen. The article does not contain any new contributions, but it is a

very good resumé of various phases of this subject. His insistence on the more general use of the ophthalmoscope, especially the direct method, cannot be too strongly endorsed.

John D. Hartwell, in the *Boston Medical and Surgical Journal*, for July, analyses one hundred and thirty-three cases of fracture of the spine treated at the Massachusetts General Hospital. As a result he arrives at several very definite conclusions of which the most interesting are the following:

The mid-cervical and dorso-lumbar regions of the spine are most frequently injured.

Tenderness over the site of injury is the most frequent and reliable sign of vertebral fracture.

The presence of priapism is a bad prognostic sign.

Injury to the cord, where present, is an accompaniment of the spinal fracture in a very large majority of cases; not secondary to hemorrhage or edema or persisting bone pressure, which are of relatively rare occurrence.

Laminectomy in this series has been accompanied by a definite operative mortality, and operative treatment in the present series has not shown better results than conservative treatment. Laminectomy is contraindicated in all patients who have received injuries in addition to the spinal fracture, and in all patients with uncomplicated vertebral fracture, whose cord injury accompanied the fracture, until at least four days have passed—the minimum time for spontaneous improvement to manifest itself.

The results of the operative treatment are certainly not encouraging. His advice, however, to wait for four days before resorting to operation is not in line with the experimental observations of Allen and Sweet, who showed the advantages of laminectomy with incision of the cord if carried out in the first thirty-six hours.

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ORIGINAL ARTICLES.

EARLY RECOGNITION, TREATMENT AND PROGNOSIS OF CONGENITAL DISLOCATION OF THE HIP.

By HENRY BASCOM THOMAS, M. D., Chicago.

The result obtained in the treatment of congenital dislocation of the hip depends upon:

1. The discovery of the presence of a congenital dislocated hip in a child under four years of age.
2. The recognition by the parents that this is a most serious affliction.
3. The anatomical condition and relative position of the head and neck of the femur and the acetabulum.
4. The surgical replacement, immobilization and release.

The above are four steps in the treatment of this deformity, and any one of the first three, plays a more important part in the prognosis than the fourth. When the physician, the nurse or the parents fail to recognize this deformity until the child has passed four years of age, they have placed the patient in a position where the chance of replacing the head of the hip in its socket decreases as the age increases. In most instances, cases coming for treatment at the age of 6, 7, to 10 and 12 years, whose prognosis would have been splendid had they come earlier, are unbenefited by one, two or three attempts at manipulative replacement.

Open operation may be tried on these unfortunate patients, but the prognosis is usually bad. Although some few cases as old as 15 years have been successfully treated, their number is small, and the number of failures at ages above four is a vigorous argument for energetic, educational methods which will teach the physician, nurse and parents to recognize these cases early and have them treated at the proper age. The more I see of the ignorant and careless neglect of these crippled patients, the more I am convinced that we should make special effort to impress on the nurse and mothers that early recognition is probably the greatest factor toward obtaining a *perfect joint* in these cases.

Late Walking. Children with congenital dislocation of the hip walk late, not until 14, 15 months or two years. When the child is backward about walking the reason should be found and the doctor should be given a chance to make a diagnosis.

The Limp. The same may be said regarding a limp or waddle in a child's gait. The nurse, the parents and the doctor should learn its cause. They should appreciate this danger signal.

Diagnosis. The diagnosis of congenital hip is not difficult. *The child walks late but continues to walk after it begins.* There is no pain. If only one hip is dislocated the leg is shorter on that side and the gluteal folds are asymmetrical. The trochanter on the affected side is higher, and will slip up when the weight is put on



Fig. 1.—Back view of patient, 6 years old, with double congenital dislocation unreduced. The hips are broad, and the legs are unduly separated at gluteal folds. See Fig. 5.



Fig. 2.—Side view of patient shown in Fig. 1. Pelvis thrown forward, back shows lordosis.

the dislocated limb and slide down when the weight is shifted to the other leg.

In a case of double congenital dislocation, the legs are near the same length, the gluteal folds are symmetrical. The trochanters are both high, high above Nelaton's line. They both slip up and down as the weight is shifted from one leg to the other. The back is lordosed; the abdomen protrudes. The hips are prominent. The walk is characterized by a waddle. Congenital hip may be confused with coxa vara, fracture of the femur, tuberculous hip, traumatic dislocation, infantile paralysis, etc., but is usually easily differentiated by the history of the case.

Treatment. Now, there is no chance for these patients unless, after recognition of the condition, the parents can be made to see the necessity for this operation and for a six or eight months' confinement in a plaster cast. It is surprising how often this deformity in the young child causes such slight tendency toward a limp that the condition is minimized by the parents, who insist that the trouble



Fig. 3.—Back view of patient shown in Figs. 1 and 2 five years later, at 11 years of age. Reduction accomplished by manipulation. Perfect function. See Fig. 6.



Fig. 4.—Front view of patient shown in Fig. 3. A girl who looks fit to meet all physical demands of life. The hips are strong and contour normal.

will be outgrown and who neglect treatment until the increasing weight and function finally convince them, when too late, that treatment is called for. Here, then, is the second link of so vital importance in this series of four steps in the cure of congenital hip. The efforts of the field nurse or social worker in having an examination made to determine the reason why a child has walked late or limps is of vital importance, but it amounts to little, unless the final

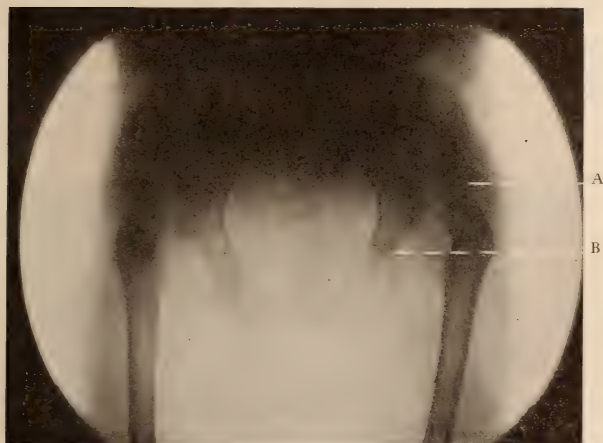


Fig. 5.—Roentgenogram before operation of hips of patient shown in Figs. 1, 2, 3, and 4. A, position of the dislocated head; B, acetabulum, the normal position of the head.



Fig. 6.—Roentgenogram after operation of hips of patient shown in Figs. 1, 2, 3, and 4. Heads of femurs in place. A, false position of head before operation; B, acetabulum containing head after operation.

crippling which will follow increasing weight, age, and function can be pictured to the parents in such a way as to get them to consent to operate. Those who obtain consent and force diagnosis deserve the highest credit for good results obtained in these cases. It is surprising how difficult in some instances it is to manage the parents of these children. They do not see the need of interference. There is no pain. The child walks well enough. I can cite several



Fig. 7.—An unfortunate child, 5 years old. Posterior dislocation of both hips. Broad pelvis, lordosis. Repeated attempts at reduction failed. She should have been seen at 3 years of age. Though younger than patient shown in Figs. 1, 2, 3, 4, 5, and 6, reduction was impossible.



Fig. 8.—Same patient as shown in Fig. 7. Notice the lordosis, the pelvis set forward because the heads are posterior.

cases where the best efforts of the follow-up orthopedic nurse, visiting nurse, social service workers, health department nurses, family physician, have all been unsuccessful. The Juvenile Court and the priest failed as flatly.

Let us consider orthopedic treatment of congenital hip under three heads.

1. *Manual Replacement.*
2. *Mechanical Replacement.*
3. *Open Operation.*

less method, is familiar to all and needs little comment. Since the The manual method first done in Europe and known as the blood-

days of Lorenz' visit more gentleness and carefulness are used and the method has been changed considerably. The first step is to loosen up the adductors and extensors by kneading them and by stretching them gently by movements in abduction and flexion. Gradually, the thigh with leg extended is flexed until the shin touches the anesthetist's cone. Then with the knee at right angles to the thigh and the thigh at right angles to the body, abduction is made until the knee is on a plane posterior to the buttocks. When



Fig. 9.—Same patient as shown in Figs. 7 and 8 six years later. Reduction of the hips never accomplished. Notice the trochanter on the right side, made high and prominent as she bears her weight on the right leg. The femoral heads slip up and down about $1\frac{1}{2}$ inches with every step.

these two postures are accomplished the muscles are usually relaxed enough to allow you to attempt replacement. This is done by flexing the thigh with the leg extended, until the latter touches the anesthetist's cone, then, with flexed knee, rotating and abducting the thigh until it reaches a position in a plane posterior to the buttocks. While this is done the thumb is pressing under the trochanter. If the head of the femur and acetabulum are fairly well formed, if the displacement upward is not too great, the replace-

ment now usually takes place without much difficulty and gives evidence of its new corrected position, first, by a loud click, usually felt and heard; second, by the presence of the head in the groin; third, by the resistance offered to an attempt to straighten the leg on the thigh. This is the method *par excellence* and in most of the cases of desirable age, success is assured without excessive bruising



Fig. 10.—Congenital dislocation of both hips untreated in a young woman 22 years old. A diagnosis was not made until she was 19 years old. Notice the prominence of the trochanters and the space between the upper thighs. This girl is of a very strong physical type, but is disabled by the crippled hips. She can walk only a few blocks at a time.



Fig. 11.—Double congenital, untreated, unreduced dislocation of the hips in a woman 44 years old. Osteoarthritis, favored by the trauma, developed, the deformed heads and necks have flattened out and worn away. This case was diagnosed at 32 years of age.

of the parts or fracture of the thigh which was so common in the early cases. Even in the older cases this method, in the hands of those experienced, will prove successful if the condition of the anatomical parts and the degree of displacement will allow.

Instrumental reduction is practiced in the East and consists of reducing the hip by means of blades and screws fixed to a specially

made table by a steel blade on a swivel, capable of being adjusted at any angle. A second blade below and like the first is placed against the trochanter of the flexed abducted thigh. The second blade is now moved by turning the handle of the screw. By this means it is possible to force the head into the socket. My observations lead me to believe that this method is inferior to the manual replacement.

I was fortunate enough to see several double dislocations on which the manual method was used on one hip and the mechanical table was used on the other in the same patient at the same operation. In each instance, it was obvious that the manual method was preferable and that reduction was done more quickly, under direct touch and control of the hands, enabling a diagnosis of the position of the head to be made which is obscured to the touch by the blades when the machine is used.

The open operative method is resorted to as a last recourse in those cases which baffle the manual method.

Open operative reduction is never to be advised in double congenital dislocation. It is advisable only in unilateral cases, especially selected, and willing to accept the frequent dangers. The death rate is high, function in cases reported successful is not perfect, ankylosis results in most of them.

AN EXPERIMENTAL STUDY OF THE EFFECT OF SUNLIGHT UPON REPAIR OF FRACTURES.*

By HAROLD NEUHOF, M. D., New York City.

Sunlight has been invoked for the treatment of a great variety of conditions, and reports of its efficacy have appeared, from time to time, throughout the history of medicine. It remained for Rollier to differentiate clearly between the beneficial influence of fresh air and the effect of sunlight. He placed heliotherapy upon a well-defined basis in its application to one condition: surgical tuberculosis. His successes over a period of many years have been so remarkable that to heliotherapy must be ascribed the best results that have as yet been obtained in the treatment of surgical tuberculosis.

Many studies have demonstrated that sunlight has an undoubted effect upon the body tissues, chiefly by its violet and ultraviolet rays, but our knowledge of the nature of that effect remains obscure. In view of their results, it is not surprising to find that Rollier and his associates believe that the sun's rays have a well-nigh specific healing effect upon tuberculous lesions. Briefly, their plan of treatment consists in exposing successively all parts of the body to sunlight, the dosage being progressively increased until exposure of the entire body is practised. The exposure of the tuberculous focus itself is of *secondary or no importance* in the result, the healing effect of the sun's rays being a general one on the body tissues. It would lead too far afield to discuss the many important details of the application of heliotherapy. Two conclusions derived from Rollier's work are germane to my subject. First: Upon analysis of his case-reports the most brilliant results are to be found among the patients suffering from bone and joint tuberculosis. Secondly: Although heliotherapy for months or years is necessary in order to obtain good and permanent results, Rollier often noted improvement soon after the treatment was instituted.

From a consideration of the foregoing, there arose several questions that appeared susceptible of experimental proof. 1. Has sunlight, by its general action upon the body tissues a demonstrable healing effect upon non-tuberculous lesions? 2. If so, could that effect be observed at an early stage, that is, within several days or weeks? 3. If it existed would such acceleration of repair be especially notable in bone lesions?

*From the Department of Surgery, College of Physicians and Surgeons, Columbia University.

The experimental work consisted in the study of the repair of fractures¹ in rabbits exposed to sunlight. Three series of experiments were performed at different seasons of the year—spring, summer, and autumn. Animals of approximately the same age and weight were chosen for each set. The identical fracture having been made in all of one series, the rabbits were separated into two groups: One-half for the sunlight, the other, away from the sunlight. All were placed on the roof, receiving the same food and at-



Fig. 1.—Rabbit No. 3458. No sunlight. Barely palpable callus. Very soft union.



Fig. 2.—Rabbit No. 3457. Sunlight. Largest callus of this group of experiments. Soft union.

tention. The only difference was that the members of one group were exposed daily to the sunlight, the others were screened from the sun. The screening was arranged to avoid any interference with air supply. The same large cage space was given to all. The sexes were segregated. Whenever there was any doubt as to physi-

¹The underlying practical reason for choosing fractures for investigation was my belief that the treatment of fractures, in contrast with the treatment of extensive wounds elsewhere in the body, has been too purely local and mechanical in character. Positive experimental evidence might lead to the assumption of a broader viewpoint. It might, for example, suggest a means for accelerating healing of fractures or for avoidance of non-union when the common causes therefor (constitutional disease, interposition of soft parts, etc.) do not exist.

cal condition the rabbits that appeared best nourished were always selected for controls.

The bones chosen for fracturing were those in which there would be minimal motion after operation—ribs and fibulae. By this choice any great variation in the mobility of fragments after operation on various bones—a factor that might invalidate the results—was avoided. The ribs were thought especially desirable for experimentation for, if two were divided, considerable separation would result, and the manner of healing at the cut ends could be



Fig. 3.—Rabbit No. 3459. No sunlight. Somewhat larger callus than No. 3458. Soft union.



Fig. 4.—Rabbit No. 3460. Sunlight. Large callus, but smaller than No. 3457. Almost solid union.

best studied. The technic of operation was very simple. Under full ether anesthesia and with adequate asepsis, a short incision was made over the bone. Bleeding from the soft parts was carefully controlled. Without any handling of the periosteum the shaft of the bone could be sufficiently exposed for section. Together with its undisturbed periosteum the bone was divided transversely by a single cut of a sharp heavy scissors. The soft parts and skin were carefully sutured in layers. Twenty-four experiments were per-

formed. Reports will be limited to those in which primary union occurred and the animals were in excellent condition and not pregnant at the conclusion of the experiments.² Changes in weight were insignificant; in most instances there was a slight increase. No difference either in weight or in general condition was discernible between the "sunlight" and the "no sunlight" rabbits. There was no recognizable difference in the healing of the incised soft parts. Therefore, my observations will be confined to the question of bone repair.

Differences in the repair of the fractures were estimated in sev-

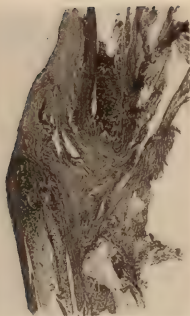


Fig. 5.—Rabbit No. 3226. No sunlight. Very small callus. No union.

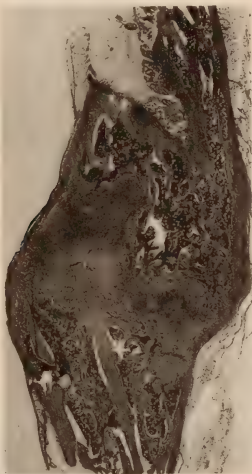


Fig. 6.—Rabbit No. 3230. Sunlight. Very large callus. Good union.

eral ways: X-ray examination, tests of the strength of union, inspection of the gross specimens, and microscopic examination. By all these means, but especially by the last, definite differences were observed. In almost every instance fracture-healing in the "sunlight" rabbits was far more active and vigorous than in the "no sunlight" animals. X-ray examinations showed greater broadening and tufting of the fractured ends, and earlier and more active callus formation. The radiographic evidence was supported by inspection

²The differences in repair to be noted between the sunlight and no sunlight experiments were paralleled in the animals whose general condition became poor or whose wounds were infected. The latter are excluded from consideration because conclusions can manifestly not be drawn from them.

of the isolated specimens; this disclosed greater thickening at the site of fracture in the "sunlight" rabbits. Strength of union was tested by fixing the ends of the isolated bones (cut into equal lengths) and suspending weights at the site of fracture.³ Specimens from the "sunlight" animals almost invariably withstood more weight before bending than those from the controls.

As has been stated, however, the most striking differences were observed in the microscopic examination. In the specimens from the "sunlight" animals there was almost invariably a much broader and more vascular zone of activity at the fracture ends, and earlier and more vigorous osteogenesis between the two fragments. Many slides were made from each specimen. The contrast was very marked in about 75 percent of the slides, less marked in the remainder. In not a single instance was there greater activity of repair in the control. In short, the controls demonstrated normal repair as ordinarily seen after experimental fracture; the "sunlight" animals presented hyperactivity of repair.

PROTOCOLS OF EXPERIMENTS.

Spring Experiments on Fractured Fibulae—Operations performed on April 13, 1915. Experiments terminated at the end of eleven days. Of these seven were very sunny, the remainder cloudy and sunny; rain on one day. *Results:*

Rabbit No. 3458. No sunlight (Fig. 1). Barely palpable callus. Very soft union.

Rabbit No. 3457. Sunlight (Fig. 2). Largest callus of this group of experiments. Soft union. Bone cracked on removing specimen.

Rabbit No. 3459. No sunlight (Fig. 3). Somewhat larger callus than 3458. Soft union.

Rabbit No. 3460. Sunlight (Fig. 4). Large callus, but smaller than No. 3457. Almost solid union.

Autumn Experiments on Fractured Ribs—Either the sixth and seventh or the seventh and eighth ribs were divided in each experiment. Operations performed on October 13, 1916, terminated at the end of seven weeks with a single exception (rabbit No. 3225). About 75 percent of the days were sunny. *Results:*

Rabbit No. 3226. No sunlight (Figs. 5 and 7). Very small callus in each rib. No union in either.

Rabbit No. 3230. Sunlight (Figs. 6 and 8). Very large callus in each rib. Good union in one, no union in the other.

Rabbit No. 3225. No sunlight (Figs. 9 and 11). Experiment terminated after ten weeks. Moderate callus in each rib. Good union in one rib; very soft union despite unusually good apposition of the rib ends, in the other.

Rabbit No. 3228. Sunlight (Figs. 10 and 12). Good union and large callus in one rib, soft union and moderate callus in the other.

Rabbit No. 3227. No sunlight (Fig. 13). Small callus and no union in one rib, soft union with moderate callus in the other.

Rabbit No. 3229. Sunlight (Fig. 14). Good union in both ribs. Large callus is one, of moderate size in the other.

Summer Experiments on Fractured Fibulae—Operations on July 16, 1915,

³This test was not employed in many of the experiments because it was thought that the microscopic picture might be distorted thereby.

experiments terminated at the end of three months. Considerable rainy and cloudy weather. The contrast between the sunlight and no sunlight experiments, as determined by microscopic examinations, was not nearly so definite as those noted in the short-time experiments, and will therefore not be illus-

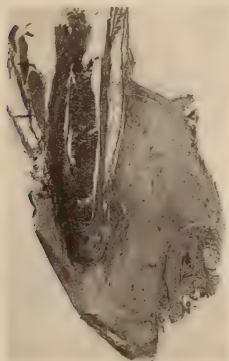


Fig. 7.—Rabbit No. 3226. No sunlight. Very small callus. No union.

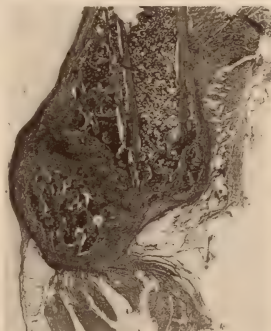


Fig. 8.—Rabbit No. 3230. Sunlight. Very large callus. No union.



Fig. 9.—Rabbit No. 3225. No sunlight. Moderate callus. Good union.

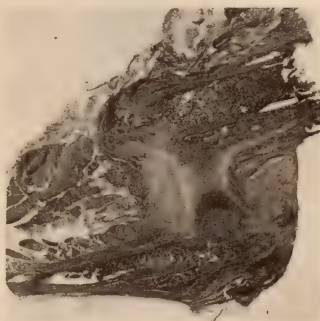


Fig. 10.—Rabbit No. 3228. Sunlight. Large callus. Good union.

trated by microphotographs. Difference in the size and density of the callus in the two groups of experiments was fairly well seen in the roentgenograms. Results of inspection and palpation of specimens:

- No. 3669. Sunlight. Firm union. Easily visible, solid callus.
- No. 3669. Sunlight. Firm union. Solid callus of moderate size.

- No. 3670. Sunlight. Firm union. Small callus, readily felt.
No. 3671. No sunlight. Firm union,. Callus barely visible, not palpable.
No. 3672. No sunlight. Fibrous union. Small callus.
No. 3673. No sunlight. Firm union. Callus not seen or felt.

For purposes of comparison the microphotographs are arranged with the "no sunlight" specimens on the left, the "sunlight" speci-

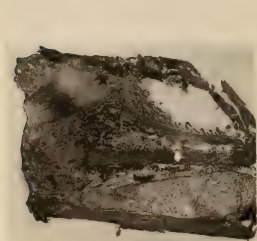


Fig. 11.—Rabbit No. 3225. No sunlight. Moderate callus. Soft union.



Fig. 12.—Rabbit No. 3228. Sunlight. Moderate callus. Soft union.



Fig. 13.—Rabbit No. 3227. No sunlight. Small callus.

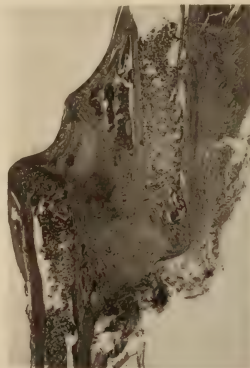


Fig. 14.—Rabbit No. 3229. Sunlight. Good union. Large callus.

mens on the right side. Sections were paired in which there was, as far as could be obtained, similar arrangements of the bone ends. Owing to the different planes often occupied by the rib ends it was occasionally impossible to get enough of both in the section to give a good picture; in such instances a characteristic picture of one rib end is shown.

CONCLUSIONS.

1. Sunlight has a demonstrable reparative effect upon fractures due to an ill-understood action on body tissues. With the demonstration of this phenomenon the healing influence of the sun's rays cannot be deemed peculiar to surgical tuberculosis alone.

2. The evidence of the action of sunlight is found in an acceleration of repair at the fractured ends of bones and an increase in the reparative zone.

3. This evidence is observable as early as after eleven days' exposure to the sun's rays.

4. In contrast to the unrecognizable effect upon healing of the soft parts in these experiments the influence of sunlight upon the bone lesions is especially conspicuous.

5. The practical significance of the experiments lies in the demonstration of this notable influence of sunlight upon bone repair and especially in the demonstration that it can be promptly obtained.

6. The reparative action of sunlight depending on its violet and ultraviolet rays, and sunlight not always being obtainable or applicable, the question of the use of ultraviolet light in the treatment of fractures deserves clinical investigation.

TRAUMATIC ANEURISM AND ITS SURGICAL CURE.*

By W. A. LINCOLN, M. D., F. R. C. S., Calgary, Alberta.

My object in choosing this subject is to bring to your attention a condition which ordinarily is not very common, but which will be more frequently seen as our wounded soldiers begin to return and unless kept in mind will give some bad falls in diagnosis.

Aneurisms may now be divided into two classes. 1. Those due to syphilis, as the Wassermann reaction has shown that practically all spontaneous aneurisms are due to syphilis. 2. Traumatic, where the cause is some form of injury, usually a penetrating or bullet wound which injures some of the outer coats of the artery. Such an aneurism may follow a severe bruise or contusion, more especially where the artery is already sclerosed or degenerated. The aneurism may follow soon after the injury or, more commonly, come on at a later date, even after some considerable interval. It is always sacculated in form and its sac may consist of some of the layers of the arterial wall or it may be made up of the surrounding tissues, constituting a false aneurism. It is nearly always found in the extremities, being much more common in the lower than in the upper. The femoral artery is particularly liable to this condition.

The diagnosis many times presents some difficulties. The possibility of traumatic aneurism should always be kept in mind when approaching any soft swelling of the extremities. A swelling presenting a typical expansile pulsation, with possibly a thrill and a bruit, situated in the path of an artery is easily diagnosed, but there are many atypical cases that are most difficult to detect. I shall not take up your time recounting the typical signs with which you are all familiar, but I wish to point out several conditions which may lead you astray: (1) Among conditions liable to be mistaken for an aneurism the most common is some soft swelling lying in front of an artery, so that the impulse of the artery is transmitted through it. This may be an abscess, a lipoma, a cyst, or a hematoma. Another condition often simulating an aneurism is a soft sarcoma where a bruit is not uncommon and a slight pulsation may be felt. (2) More commonly the opposite error occurs and the aneurism is mistaken for some form of new growth. I have seen a leg amputated for a supposed sarcoma which proved to be an aneurism. This error arises most often from failure to remember that there are two conditions in an aneurism which do not give pulsation, (a) when the sac is filled with laminated clot, (b) where the aneu-

*Read at meeting of the Alberta Medical Association at Banff, Aug. 20, 1916.

anism has ruptured, giving a hematoma in the surrounding tissues. Because of the lack of pulsation in these conditions a wrong diagnosis is often made. Any soft swelling of the extremities with a scar in the vicinity should be treated with suspicion whether it pulsates or not.

The prognosis without treatment is always bad. A spontaneous recovery is rare, the condition tends to get progressively worse, causing great incapacity and, finally eating its way to the surface and causing death from hemorrhage.

The treatment of traumatic aneurism has changed radically since Metas wrote his paper on the subject in 1903. Previously to this some form of the ligature operation was practiced. Of these the ideal is the ligature on both sides of the aneurism and its complete removal. This often can be done in an aneurism of the smaller arteries, where the sac is small and the collateral circulation is sufficient to nourish the part. But in the larger arteries the sac is usually so adherent to surrounding tissues that this is out of the question. The operation usually carried out in those cases was the famous John Hunter operation. In this the artery is tied some distance proximal to the sac, usually leaving a branch between the ligature and the sac. This operation has had many brilliant results, but has a considerable mortality due to gangrene of the extremity where the collateral circulation is not good. It also fails to cure the condition in a certain number of cases. As a final resort amputation is done. The Metas operation has a smaller mortality and produces a much better functional and anatomical result, as it does not depend on the collateral circulation, the main blood stream being kept intact. The principal of the operation is opening into the sac and the closing off, from within, its communication with the artery. It is sometimes very difficult or impossible. The friability of the sac may also present difficulties, it sometimes being almost impossible to make any stitch hold. After the communication is closed off a certain amount of pleating of the sac is advisable to reinforce the suture line. Very small round needles and fine silk should be used. All the suture material should be soaked in oil to prevent clotting both during and after the operation. The hemorrhage is easily controlled by an Esmarch bandage placed above the aneurism. The limb and field of operation should be kept warm and the work done rapidly. The dangers are breaking down of the suture line, and the production of emboli. The results are, for the most part, good. Success can usually be attained when the sac is reasonably strong and the sutures are rapidly and carefully placed. Should the sutures give way the ligature method can still be used. Emboli are not common when the work is quickly done and the above precautions are taken. The results when successful are very good, giving a perfect anatomical and functional artery.

I can perhaps best illustrate some of the interesting points in this condition by quoting a case that came to my notice recently.

J. M., a Greek, aged 28, referred to me by Dr. F. D. Wilson, Calgary. *History.* About eight years ago he was stabbed in the left thigh with a long slender knife which passed completely through the thigh. This was not followed by any serious consequences at the time, but he soon noticed a small swelling which never entirely disappeared, although it caused him no inconvenience. About ten days before seeking advice he experienced a sharp pain in the left thigh and noticed that it was swollen. This pain and swelling continued to increase, causing him to seek advice. *Examination.* The patient was a well-built, muscular man, walking with a decided limp. On the inner and anterior part of the left thigh just in front of the adductor muscles and a little above the center of the thigh is a tense somewhat hard swelling measuring $7\frac{1}{2}$ by $3\frac{1}{2}$ inches, in the center of which is a small, hardly perceptible scar. The swelling is regular in outline and not tender, it is not adherent to the skin or the femur; fluctuation can be elicited. There is no pulsation in the tumor, but if palpated carefully a faint thrill can be felt. A well marked bruit can be heard over it. Pulsation of the internal plantar artery can be normally felt and does not appear delayed. No edema or sign of circulatory disturbance in the foot or leg. Left inguinal glands are markedly enlarged. Wassermann reaction negative. Leucocytes 12,000. He ran a little irregular temperature of about a degree and a half above normal. *Diagnosis.* This is a case presenting some difficulties in diagnosis. He had a tense, hard mass which did not pulsate and his inguinal glands were markedly enlarged. In addition he had a slight temperature and a small leucocytosis, all of which would lead one away from a diagnosis of aneurism. Yet a careful review of the whole history led me to make a diagnosis of ruptured traumatic aneurism.

Treatment. It was decided to try and repair the artery by Metas' method. An Esmarch bandage was placed above the mass and a longitudinal incision made over it. After cutting through the subcutaneous tissue about a pint of dark clotted blood was found infiltrating the tissues. When this was turned out a sac about the size of an egg was found, connected with the femoral artery. This had ruptured, giving a hematoma which was the mass felt. The opening from the artery into the sac was about the size of a lead pencil. This was closed with fine silk sutures soaked in oil and the sac pleated over the suture to reinforce it. This was accomplished with some difficulty as the sac was very friable and held the sutures badly. The Esmarch was removed and the suture line was seen to hold. The wound was closed without a drain. A good recovery took place, but a subacute infection occurred in the wound, probably because of the large amount of tissue infiltrated with blood. This discharged for some time but eventually entirely closed, and the swelling completely subsided. It is now six months since the operation and the patient is going about his usual occupation of a common laborer, his injured leg being quite as strong and good as his other.

ERYTHEMA FIGURATUM PERSTANS.

By FRED WISE, M. D., New York City,

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Columbia University; Attending Dermatologist, Vanderbilt Clinic and
Montefiore Home; Chief of Clinic in Dermatology, Mt. Sinai
Hospital Dispensary.

Many different diseases of the skin have been given the name "erythema," coupled with various qualifying adjectives serving to differentiate one form of erythematous exanthem from another. The peculiar, variegated manifestations of erythema multiforme are familiar to most practitioners of medicine; the affection is a common one, attacking the rich and the poor, young and old, male and female, without discrimination. The eruptions are most commonly observed during the spring and fall months; recurrences are frequent, especially in women. Rheumatic symptoms and evidences of intestinal intoxications are often found to exist during and between attacks. Many toxemias manifest themselves in the integument by an eruption of multiform erythema; it has been observed in association with tuberculosis, syphilis, gonorrhea, and following the ingestion of spoiled articles of food, the administration of potassium iodide, various coal-tar products, injections of antitoxins, etc.

ERYTHEMA MACULATUM PERSTANS. FIG. 1.

While nearly every one is conversant with these transient eruptions of erythema multiforme, it is not so commonly known that sometimes the lesions, instead of being fugacious, may be quite persistent and may show little or no signs of involution for weeks, months or even years. In the past year, five examples of this type of dermatosis were observed by the writer, in Prof. Fordyce's service at the Vanderbilt Clinic. The eruption consists of three or four, to several dozen, large and small, discoid, oval, and irregularly lobulated, smooth, reddish, purple, and violaceous patches, situated on the trunk and extremities, more particularly on the abdomen, chest, and buttocks. The patches may vary in size from a half inch to several inches in diameter. Sometimes several coalesce, forming irregular, large plaques. The lesions usually are at first red in color and, as they grow older, they assume a purplish to violaceous hue, many of them become frankly purpuric; on involution, they become distinctly yellowish to brown, finally leaving a patch of brown, pigmented skin, sometimes uniformly tinted, at other times stippled and reticulated in appearance. The acute and subacute erythematous phases of the exanthem may persist for weeks or months before

the lesions finally reach a state of quiescence. After a lapse of weeks or months, a fresh attack is likely to occur and, what constitutes the remarkable feature of the affection, the new patches are usually found to appear exactly over the same sites as in the original eruption. One gets the impression that the affected areas have a diminished resistance to the causative agent, most probably a toxin circulating in the blood. Histologically, the changes are es-



Fig. 1.—*Erythema maculatum perstans*. Showing erythematous macules, purpuric plaques, and pigmented areas.

entially the same as those occurring in the banal forms of *erythema multiforme*.

This peculiar form of persistent multiform erythema¹ is mentioned chiefly to guard against its being confounded with *erythema figuratum perstans*, an eruption which presents quite a different picture.

ERYTHEMA FIGURATUM PERSTANS. FIG. 2.

Erythema gyratum perstans is a designation first employed by Colcott Fox, in describing eruptions of the type under discussion

¹A study of our cases of *erythema maculatum perstans* is under way at the Vanderbilt Clinic, the investigations being conducted by Dr. Abramowitz, who will later publish his findings.

(*International Atlas of Rare Skin Diseases*, V, 1901). In 1905, Wende read a paper before the American Dermatological Association, under the title, "Erythema Perstans, with Report of Two Cases Involving Circinate Lesions" (*Journal of Cutaneous Diseases*, June, 1906, XXIV, p. 241). Three years later, Wende read a supplementary paper on the subject, before the Cutaneous Diseases Section of the American Medical Association, under the title, "Erythema Figuratum Perstans" (*Jour. Amer. Med. Assn.*, Dec. 5, 1908, LI, p. 1936).

In the first paper, Wende discussed all varieties of persistent ery-



Fig. 2.—Erythema figuratum perstans. Showing the circinate and nodular lesions, some of which have temporarily subsided after the use of chrysarobin ointment.

thema, "some of which had been described previously as special diseases, each having its own pronounced characteristics." In the second paper, he has "eliminated all save one variety. This variety presents persistent erythematous patches, which assume annular, marginate and gyrate forms, differing essentially from other varieties of erythema." He then describes a new example of the disease and submits a brief review of similar cases appearing in the literature.

These two papers are so complete in every essential detail that the writer can offer nothing of importance, on the strength of his own observations. It will, therefore, suffice to submit the following case report, illustrating a typical example of erythema figuratum perstans.

REPORT OF CASE.

Patient. Mr. S., aged 34 years, single, born in this country, was referred to the writer by Dr. Benjamin Salzer, for the treatment of a persistent eruption of the skin, which resisted ordinary remedies. The patient was a tall, well built, healthy looking individual and stated that he had never suffered from any serious illness, including gonorrhea and syphilis. The family history was negative. The eruption first made its appearance about nine months ago, in the form of bright red nodules, wheals and plaques, on the shoulder, chest, axillae and upper arms; they itched moderately. Shortly afterwards, a very pruriginous, scaly and erythematous eruption appeared on the inner side of the thighs, in the groins and about the genitals. While the lesions on the upper part of the body remained unchanged for a considerable length of time, those on the thighs rapidly assumed a highly inflammatory appearance and caused much annoyance.

Examination (October, 1916):—Two entirely different types of lesions were present. The inner surfaces of the thighs and the skin of the groins and genitals exhibited an acute erythematous-squamous eczema (microscopic examination of the scales, for tinea fungus, proved negative. The eczema was cured within a few weeks, under appropriate external remedies). The skin of the chest, upper abdomen, flanks, anterior aspect of the shoulders and back of the neck presented a large number of flat, reddish and purplish nodules and plaques, varying in size from an eighth to a half inch in their diameters; their surfaces were smooth, free of scales and somewhat glistening in appearance; they were sharply defined and slightly raised; most of them were discrete, but some had coalesced to form lobulated patches; most of these nodular lesions were seen on the abdomen and flanks. In the axillae, on the front of the shoulders and on the upper part of the chest, the skin presented numerous annular and gyrate figures, some of them discrete, others confluent. The edges of these annular and gyrate lesions were distinctly raised, sharply defined and abruptly margined. While some of them evidently acquired their circular outlines and garland-like configuration as the result of the involution of the central portions of some of the larger, solid plaques, others appeared to form segments of circles, arising independently. The raised portion of skin delineating these rings and segments of circles varied in width from an eighth to a quarter of an inch, were hard (almost keloidal) in consistence, grayish to reddish in color; the inner edges of these margins were distinctly scaly and showed a crater-like slope toward the center of the ring; the outer edges were smooth and free of scales. The interiors of these annular patches were yellowish in color and presented a slight, branny desquamation.

Course:—During a period of close observation extending over four months, only slight changes manifested themselves in this eruption. Under mild treatment, employing inunctions of ointments containing salicylic acid, resorcin and precipitated sulphur, the inflammatory symptoms subsided in part, but the original lesions persisted, while new outbreaks made their appearance on the abdomen and flanks. Under strong chrysarobin ointment inunctions, some of the nodular and gyrate efflorescences disappeared but for only a short time, to reappear in the same sites when the rubbings were discontinued. An intense inflammation with subsequent profuse desquamation was produced in the

affected areas with the ultra-violet light. For a time it was thought that the disease had been conquered, but the patches reappeared and have persisted, practically unaltered.

Internally, various remedies were employed empirically. Among these were calcium lactate, arsenic, thyroid extract, etc. The patient being in apparently normal health, the determination of appropriate internal medication was obviously a difficult matter. Careful examinations of the blood and excretions revealed not the slightest abnormalities. The internal remedies had no visible influence upon the eruption.

The eruption in this patient conforms quite closely to those which Wende described. As he states, it differs from erythema multiforme in that the latter exanthem is frequently associated with constitutional symptoms, the lesions exhibiting variegated colors, appearing as macules, papules, various types of vesicular and bullous formations, concentric rings, etc. Furthermore, erythema multiforme commonly first makes its appearance on the face and backs of the hands, while erythema figuratum perstans affects chiefly the trunk. While the lesions of erythema multiforme are evanescent and short-lived, those of erythema figuratum persist indefinitely. No definite etiological factors have been proved in either type of the affection.

Histological Examination.—A pea-sized nodule was excised and studied microscopically. The striking feature of the section was the paucity of the pathological alterations manifested in what appeared to be an actively evolving, distinctly indurated lesion. The induration, instead of being due to a cellular infiltration as was anticipated, evidently was the result of the intense edema of the connective tissue of the skin.

In a general way, the microscopic changes differed hardly at all from those existing in ordinary types of multiform erythema in its maculo-papular stages. The epidermis was moderately hyperkeratotic, the rete cells somewhat swollen and edematous; the palisade cells were destroyed by the edema and pressure of the underlying connective tissue, and the basal membrane was nowhere visible, the rete cells resting directly upon the papillary bodies. The latter were quite edematous but not markedly changed in shape or size; the blood and lymph vessels within the papillae were markedly dilated; a scattered, irregular infiltration of lymphocytic cells obtained in some few of these papillae, some of the cellular elements invading the malpighian layer of the epidermis. The deeper portions of the corium presented several widely scattered areas of more or less circumscribed lymphocytic cell infiltrates, most of the cell aggregations lying in close relation to the blood vessels. The latter were dilated, the walls of many of them markedly thickened; in the deeper portions of the cutis, the vascular walls were intensely edematous, its component structures showing signs of degeneration. The collagen took part in the edematous process, its bundles being swollen, lying in compact, parallel strands, giving the appearance of a greatly thickened pars reticularis. Among these strands, there were scattered, elongated cellular aggregations, composed of lymphocytes and a few connective tissue cells. The coil glands presented slight changes due to edema. Sebaceous glands were not present. Throughout the corium were seen large, dilated lymph spaces, with extravasated red blood cells here and there and occasional lakelets of blood serum.

DIFFERENTIAL DIAGNOSIS.

Differentiation of the lesions of erythema figuratum perstans from other dermatoses involves a consideration of many different skin diseases. Ringworm, syphilis, mycosis, fungoides, gyrate psoriasis, leprosy, granuloma annulare, the annular form of lichen

planus, certain forms of lupus erythematosus, various tropical affections manifested by ringed eruptions—in short, the dermatoses characterized by the occurrence of persistent circinate, scalloped or festooned efflorescences are to be excluded in arriving at the diagnosis. From the annular variety of erythema multiforme, the affection differs chiefly in respect to its chronicity and recalcitrance to treatment, its sites of predilection, and the presence of a sharply defined peripheral band, the inner edge of which is sloping and scaly.

As is the case with so many obscure eruptions of the skin, recourse must be had to laboratory investigations to identify the malady. Microscopic examination of an excised lesion, animal inoculations, serological tests, attempts to cultivate the various fungous parasites of the skin, etc.,—one or all of these invaluable aids to dermatological diagnosis may be essential to the correct interpretation of a given eruption.

For the photographic reproductions the writer is indebted to Dr. G. M. MacKee, of the Vanderbilt Clinic.

24 West 59th Street.

THE VALUE OF SKIN GRAFTING IN THE TREATMENT OF BURNS.

By A. RAVOGLI, M. D., Cincinnati, Ohio.

The only way that we can obtain the healing of an extended raw surface the result of a burn is by skin grafting. In many cases the epidermization takes place without trouble. The epithelium is formed always from pre-existing epithelium. From the edges epidermic layers are formed which cover the raw granulating surface. In a raw surface islands of epithelium are found scattered in different places, and from them epidermization is extending. Those islands are nothing else than epithelium from the hair follicles or from the excretory ducts of the sweat glands, which escaped destruction, and their epithelium is reproducing and helps the covering of the raw surface. In some cases, however, thick granulations are formed on the exposed area of the granulating surface, which prevents the epidermization, and if let heal up by themselves will produce a bulky, irregular scar, keloidal condition, with contractions, and resulting disfigurement.

In these cases it is our duty to help nature by transplanting the skin, or better, flaps of epidermis so as to obtain a new epidermic cover, to promote the healing of the granulating surface with a regular cicatrix.

In the living body the epidermis is continually shed or worn away, the wasting being made good by regeneration from the deeper layers. The tissues when transplanted are subject to similar changes. If disintegration and absorption predominate, the graft is bound to disappear. If on the other hand regeneration keeps pace with absorption, the graft maintains its existence. Lexer¹ remarked that in order to obtain a clinical success the ideal has to be reached, where the healing of the tissues takes place histologically. The masses of cells have not only to hold together, but regeneration at the site of the wound and of the flaps has to occur. Healing in this case is effected with gradual disintegration of the transplanted tissues, together with coincident regeneration of their elements.

Causes of Failure.—In some cases the skin grafts do not succeed but are exfoliated, after a few days, with suppuration. This result is not necessarily due to a wound infection, but may arise when transplants are taken from another man ("homografts"). The difference in the foreign serum and cell proteids causes a reaction resulting in the production of ferments which destroy the trans-

planted tissues. The best results are obtained by the transference of a portion of the skin from one part of the body to another on the same individual ("autoplasty") (Law²).

Failure may also be due to interference with the blood supply. If to exuberant granulations grafts of skin are applied, necrosis or suppuration must surely follow.

In the early days of skin grafting it was not uncommon to see individual grafts disappear in the discharge and yet a vigorous growth of the epithelium would follow, which without the grafting could not have been obtained. Only a few days ago we grafted skin from the thigh to the leg of the same woman so as to obtain the healing of an extended ulceration of the right leg, from multiple ulcerated gummata, which for many months had refused to heal up. The grafts after a week began to slough off, and it was considered an insuccess. Yet in these last days the whole surface has been covered with a layer of thick epithelium, and shows signs of healing up.

Even with autoplasmic grafts success is not always attained. This may be due to damage to the graft, or to the presence of conditions interfering with adhesion.

The cultivation of tissues *in vitro* has confirmed the clinical observation that the simple tissues, which receive their temporary nutrition by osmosis from the plasma, can survive better until the blood supply is reestablished. The more complex tissues need an immediate blood supply for their survival, proliferation and proper functioning.

The soil of the wound is of great importance, because this supplies nutrition to the graft, and early adhesion of the edges to the surface secures the lymph flow, and the establishment of the circulation to the graft. If the cells have been injured with antiseptic solutions, nutrition may be delayed. When the wound or the transplant are not strictly aseptic, the contamination causes suppuration, and the graft falls in necrosis.

A great obstacle to success in skin grafting is imperfect hemostasis. The blood remaining on the surface of the wound prevents the adhesion of the transplant and thereby interferes with the nutrition of the graft.

Precautions for the Operation.—Lexer¹ lays down the following rules:

1. Strict asepsis.
2. Complete hemostasis.
3. Care in removing, handling, and implanting the graft.

In our practice we keep moist dressing, with 1 to 2,000 of bichloride mercury, on the surface to be covered with grafts, for several days, until pus has entirely disappeared, and the granulations are fresh, red, and of a healthy appearance. When the infection is from

bacillus pyocyaneus, it is better to wait a couple of weeks, to be sure of removing the infection. Aseptic field and sterile plasma are the culture medium for a transplant. The surface has to be scraped with a sharp curette in order to remove the old granulations, which would interfere with the life of the grafts, and the edges have to be freed from the hard epidermis, which usually interferes with the cicatrization. With a swab moistened with warm normal salt solution the surface is gently dabbed until the bleeding stops and a fibrinous film is forming. In this way the grafts are brought into intimate contact with the capillaries of the prepared surface.

Technic of the Operation.—In autoplasty the flaps of epidermis are usually taken from the thigh. The chosen area is sterilized, shaved, and bathed with alcohol. The surroundings of the wound are sterilized, shaved, and painted with tincture of iodine. The thigh is held tight by an assistant with both hands, making the surface bulge up. The operator with the left hand grasps and presses the skin. With the right hand cuts the strips of the epidermis with sawing motion of the razor. In this way can be cut a flap one inch long and a good half inch wide. This flap remains on the blade of the razor. The lower edge of the flap may be cut by twisting the razor gently, otherwise an assistant detaches it with scissors. The assistant with a dropper drops salt solution on the blade of the razor until the flap of skin is detached and nearly floats. The razor is so transferred on the bed of implantation, the salt solution is continually dropped on the blade, and by the help of a forceps the transplant is gently set in its place without curling or distorting its shape with probes or other instruments.

So far for the Thiersch method. In burns I am also using the method of Reverdin, relying on the property of the epidermis to reproduce other epidermis. In these cases only small flaps are cut and placed on those parts of the wound, which most need help for the formation of epidermis.

The application of strips of epidermis to repair large areas of skin wounds has to be done where prevention of ugly scar formation is sought. This is important on the face and near joints. Successful epidermis transplantation terminates in healing with smooth and soft skin surface. Scar like thickening of the corium, ugly swelling, and intense hyperemia follow the freshening of old wounds in individuals affected with tuberculosis, or in those subject to keloidal formations.

Skin Flap Transplantation.—When we have to deal with heavy, thick scars, the transplantation of epidermis is not practical and the transplantation of flaps of the skin finds its usefulness. Transplantation of the skin, in its entirety, can be done, according to Krause, without fat, or according to Esmark, using the fat with

the flap. Hirschfeld maintained that the healing takes place with or without fat. Lexer for repairing the loss of facial skin, uses padded flaps. In the transplant of the fat, the graft becomes encapsulated into the connective tissues, like a foreign body, no absorption or substitution takes place. According to Thompson³ the flap retains its shape and size, and in this way only it is capable of restoring the facial features.

We can say in a general way that transplantation of the epidermis is the most uniformly successful method. The method usually employed is that introduced by Ollier in 1872, and perfected by Thiersch⁴ in 1874, applying strips of epidermis and transferring them directly on the raw surface. When, however, the surface to be covered is too large, necessitates too large a quantity of epidermis, the method of Reverdin is still good, and in our hands it has given brilliant results.

Successful healing takes place by primary adhesion. When the intimate contact of the graft and the surface is disturbed by bleeding or by infection, the glueing process does not take place, inflammatory exudation occurs and the flaps die. The attachment of skin flaps to the raw surface takes place in from three to five weeks; epidermal grafts grow much faster and in a couple of weeks the result can be seen. By grafting the epidermis we obtain rapidity and certainty that the repair takes place. In all cases where epidermis has been transplanted, we have obtained good results. We never had occasion to transplant skin from the scalp, or skin from the pubis to repair the eyebrows or the upper lip for cosmetic reasons, but from the experience of Lexer and others, results have been unsatisfactory.

When the flaps of epidermis do not take, this is not always due to faulty technic, but mostly results from the condition of the patient. In some cases, in spite of the best aseptic precautions, necrosis and suppuration follow with shedding of the flaps. This occurs in anemic, tubercular, syphilitic, diabetic, or elderly persons.

Treatment of the Grafts.—It is our practice, after the grafts have been set upon the prepared surface of the wound, and it has been moistened with normal salt solution, to cover the whole surface with isinglass paper well sterilized and soaked in salt solution. A light pad of moist gauze is applied and held in position with a light bandage. After four or five days on removal of the bandage and the pad, the grafts appear somewhat swollen. The paper is moistened with salt solution, and is taken off only in the places where it can be detached without disturbing the grafts. One week or ten days later, the whole paper is removed and moist dressing with salt solution is continued until the grafts are well attached, and the process of repair is well advanced. At this point we cover the surface with 2 percent white boric vaseline. We also expose

the grafted surface to the plain air for half an hour to one hour every day, and to the sunlight if there are signs of infection, and then it is covered again with the boric vaseline.

Muirhead Little⁵ in the Royal National Orthopedic Hospital applies dry dressing upon the grafts. A. Roeyn Jones⁶ and Benson⁷ advocated the exposure of the Thiersch grafts to the air by applying a kind of cage over the grafted surface to prevent the bandage from touching the latter. At the fifth day the bandage is removed, between the edges of the grafts black crusts are seen; these are picked off with forceps. He claims recovery after three weeks.

We agree with Brunning⁸ that a good exposure to the air of the grafted area is the secret of success. The exposure in our experience has not to exceed half an hour, and after bathing with the saline solution the surface is again covered with boric vaseline.

The raw surface from which the epidermis has been taken, is covered with boric vaseline spread on a pad of gauze, which once in 24 hours is changed and dressed again; usually in ten or twelve days it has healed up.

It will be of some interest to refer to one of our cases of an extensive burn.

A boy, Bernard M., 7 years old, was admitted January 17, 1917, in the Dermatological Service of the Cincinnati General Hospital for a burn extending from the shoulders to the gluteal regions, involving nearly the whole back. (Fig. 1.) The burn was caused by the nightgown catching fire. The boy was placed in a bath of lukewarm water with some sodium bicarbonate, to remove the burned shreds of the clothes and of the epidermis. After the surface was cleaned and he somewhat quieted with $\frac{1}{2}$ gr. of morphine, a moist dressing of subacetate of aluminum was applied by our method. The burn was in part of the second, but mostly of the third degree, interesting the whole derma. Under the moist dressing the burned skin began to slough off, leaving a granulating raw surface. At the edges cicatrization began to show up. At this point we wanted to see what we could obtain with the much-praised paraffin preparation. By means of the spray the surface was covered with a layer of paraffine wax dressing. The result, however, was not satisfactory, being very much like to that of carron oil, causing pus on the wound.

Although Dowd⁹ is very enthusiastic for this new remedy, of two cases one case improved very satisfactorily, in the other the granulations became exuberant and skin grafting was resorted to. He explains the difference in the two cases by the depth of the burns. In one case where skin grafting was done, and then covered with Ambrine, the surface was found covered with pus, as in our case. We have used Ambrine substitute prepared by the druggist of the City Hospital, and applied with a spray covering the surface with an equal layer of the remedy. In cases of second degree burn, it acts well, but in the third degree we have not been satisfied. In consequence this was discontinued, and, with fresh Dakin solution, the surface was made sterile again. Treatment continued with washing with solutions of borax, then the wound was left exposed to the air, and light for half an hour to one hour, then the surface was covered with gauze saturated with borated vaseline. Internally iron tonic was given. Thick proud granulations were forming on the right gluteal region showing tendency to heal up, with regular scar.

Skin grafting was practiced on Feb. 26th. Such an enormous surface could not be covered with skin grafts by the Ollier-Tiersch method, unless by resort to heretoplasty. Nobody of his family was willing to donate skin, and consequently it was necessary to take some grafts from himself, by the method of Reverdin. Grafts were taken from the posterior region of the left thigh (Fig. 2). After the surface had been prepared and the proud granulations scraped and well bathed in salt solution, the oozing blood stopped, the grafts were cut in small strips and applied on the surface in a circular fashion beginning from the periphery going towards the center. The whole surface was covered with isinglass paper, and then with a light pad of gauze, keeping the surface moistened with salt solution. On the fifth day the paper was gently removed, and every graft was found to have taken. Each graft was a center of epidermization. It is remarkable to see how quickly the epidermic cells are forming and extending on the raw surface from the grafts. Fig. 2 shows the burned surface nearly entirely cicatrized three weeks after the application of the epidermic grafts, the patient being ready to leave the hospital. The surface was treated as explained by bathing with solution of borax, then left to the sunlight for some time, and then covered with boric vaseline. After a short time the patient could go around and attend the school in the hospital. Fig. 2 shows the result obtained, a regular scar, smooth, and perfect. The grafts are visible as more pigmented areas, which have been the center of epidermic formation. In the left thigh is yet apparent the place where the epidermic grafts had been taken. On June 2 the patient was discharged perfectly well.

Subsequent History of Skin Grafts.—The covering of the skin by grafts which have taken well is permanent. Braun¹⁰ has followed transplanted grafts of the skin for nine years, and has come to the conclusion that skin grafting insures permanent recovery. Never has there been found any untoward effect in autoplasmic skin grafting during the first year. This is not true of homoplastic transplants where, for reasons already given, a clinical recovery is effected, but no histological recovery takes place. In this regard Marchand, Henle, Endelen, Schoene and others have little faith in claimed successful results. It is interesting to refer to the work of Karg¹¹ and of Leo Loeb¹² who have transplanted epidermic grafts from a white man on a granulating wound of a negro, and vice versa from a negro on a white. They claim that the epidermic grafts took and the surface healed up with the result that after 12 to 14 weeks the dark epidermis from the negro implanted in the white lost some of its pigment, while the white epidermis on the negro, was gradually getting dark from pigment. In the same way Maxwell transplanted epidermis from a white on a granulating wound of the cheek in a colored man and noticed that gradually it was turning dark. This, however, is not confirmed by the experiments of Reverdin, Johnson, Smith, Mauel, who claim that in their cases after the recovery no change of color had taken place in the epidermic grafts.

Epidermic grafts have been taken from dead bodies a short time after death, and implanted on granulating surfaces. Bartens,¹³



Fig. 1.—Burn immediately after infliction.



Fig. 2.—Burn three weeks after grafting. A, where grafts were taken.

Iwanowa¹⁴ claim good success; Gluck¹⁵ states that the grafts taken from a corpse immediately after death, where death was not due to infectious disease, take just as well as when taken from a living person.

Sick, Scholz¹⁶ and Wagner¹⁷ with homoplastic grafts did not succeed and they obtained results only by means of autoplasic transplants. Koenig implanted skin grafts, which he had preserved in a salt solution for some time, on a wound from a burn, but without success. When he covered the wound with grafts taken from the same person, he obtained good results.

According to Lexer the ending of homoplastic epidermic transplants can occur in five ways: (1) gangrenous decay; (2) apparent healing, then, two or three weeks after, sloughing under pus formation; (3) apparent healing, then, three weeks after drying of the transplants, purulent discharge, formation of cicatrix like under a crust; (4) apparent healing, then slow cicatricial substitution; (5) progressive healing, epidermis extending from the grafts, even if taken from the skin of dead fetus.

We are now at a point to affirm that the best results are obtained in skin grafting from autoplasic transplants. Davis,¹⁹ although he maintains the superiority of the autoplasic method, praises also the homoplastic. He claims that good results are secured with grafts obtained from other individuals, as whole thickness grafts or Thiersch grafts, placing homoplastic and autoplasic grafts on the same footing. This, however, is not correct and according to our own experience autografts are to be preferred.

Experiments.—In reference to heteroplasty, transplanting skin from animals, a series of experiments have been carried on by Reverdin²⁰ and Schoene²¹ on amphibians and reptiles, by Bert on rats, by Eiselberg on rabbits, by Carnot²² and DeFlandre on guinea pigs. The results have been unsatisfactory, the grafts falling in necrosis. The conclusion is that an influential factor for the success of skin grafting in a homoplastic and heteroplastic method is nearness of zoological relationship. Family relationship is also a favorable factor. Thiersch showed that skin grafts by homoplastic transplantation take much better, when the grafts were taken from one and implanted in another sister in the same family.

The skin homografts maintain their normal appearance until the end of the second week. After this time they begin to grow with the adjoining skin, and have good appearance. They have clinically taken. Oshima²³ examined under the microscope these grafts nine days after implantation, and found signs of degeneration. At this point the epidermic layer becomes thinner and is easily removed, the epithelial cells and the nuclei show a tendency to shrink, and 16 days after they have lost their staining power.

Hair follicles, sweat and sebaceous glands had the same end. After nine days the roots of the hair showed atrophy, and at the 16th day the nuclei did not stain. The glandular part of sweat glands showed infiltration and degeneration, the excretory ducts were well maintained, the sebaceous glands had disappeared. The connective tissues of the grafts after nine days were shrunk and had lost their brilliancy. The meshes of the tissues were enlarged,

very likely on account of imperfect circulation, and were becoming edematous from absorption of serum. The nuclei of the connective tissue corpuscles were badly stained. The fibers of the papillary layer showed hyaline degeneration from the pressure of the small cell infiltration. On the contrary the connective tissue fibers of the grafts touching the granulating tissues were well maintained. The non-striated muscle fibers of the skin after the ninth day had disappeared.

It seems that degenerative alterations of the grafts take place from the upper portion. Between the degenerative alterations in the papillary layer, small capillary vessels could be seen filled with red blood corpuscles, showing that they had joined the general circulation. Elastic fibers could not be found. After 28 days the epithelial cover of the grafts had fallen, the skin was infiltrated, blood vessels could not be seen and the glands had disappeared.

From these observations it appears that a homoplastic graft of the skin acts as a passive element, like a foreign body. In successful skin grafting the autograft not only heals up, but grows, the cellular elements revive and proliferate forming new tissues, which form an organic unit with the preexisting tissues. As we observed in our case the reproduction of the epidermis is remarkable. Indeed there is a great difference between a simple healing and a successful skin graft. Healing can take place on a foreign body as a passive element without life, but in a successful transplant the graft not only heals up but grows in its cellular elements forming a compact with the other existing tissues. Oshima found that in a homoplastic transplant although the graft taken and clinically healed, the transplant, histologically, was not successful.

In our case the proliferation of the epithelial cells starting from the small grafts showed that the graft was maintained alive, and the epithelial cells were in excellent condition.

For this reason we have always preferred autoplasty to homoplasty. When the surface of the wound resulting from the burn is of a size that can be covered with Thiersch grafts, we employ these. When the surface is large we prefer to cover it in small areas by the method of Reverdin. This is much better and much more sure of success than homoplasty, with which we run the risk of seeing the graft decay and of losing our work.

CONCLUSIONS.

1. Autoplasty is always preferable to homoplasty.
2. The surface of the wound from the burn has to be perfectly clean and aseptic.
3. When Ollier-Thiersch grafts cannot be obtained, then small autografts with Reverdin method come to our assistance.

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CHOLECYSTECTOMY, A BETTER BUT A MORE DANGEROUS OPERATION THAN CHOLECYSTOSTOMY.

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The doctrine, taught at some of the great clinics, that cholecystectomy is the operation of choice and should be performed in practically all cases of gallbladder pathology, is a dangerous one for the profession at large to adopt.

It is well known by experienced surgeons that there are distinct pathologic conditions of the gall bladder and ducts which demand drainage and not removal of the gallbladder. In no other field of surgery is the judgment of the surgeon so severely and repeatedly taxed. Deaver says " . . . the question often makes Hamlets of us all." A man with a poor understanding of the pathology of these conditions—the understanding can only be obtained by a rich clinical experience—is not in the position to decide quickly just what had better be done, and is apt to resort to the method which he has just witnessed or read most about, when in truth this particular method for the particular case may be the wrong one.

The inexperienced operator, during his visits to the large clinics, is impressed with the apparent ease with which removal of the gallbladder is possible in the hands of the expert, and he comes away determined to discard the operation of cholecystostomy which he now considers cowardly and incomplete. Herein lies the great danger. Cholecystectomy to my mind is one of the most formidable operations in surgery and should be attempted only when every condition is favorable—and to be favorable the judgment and skill of the operator should be the best, the condition of the patient good and not desperate, the anaesthetist a skilled one, and the operating team well trained to give exposure without trauma, and work smoothly without delay and confusion.

In a recent paper on "The Indications for Cholecystectomy"¹ I sent out the following questionnaire to forty-five experienced abdominal surgeons, and will quote briefly from it in an attempt to show the attitude of the experienced operators on the subject.

1. What percentage of cases of cholecystostomy have had a recurrence of trouble following operation?
2. Are you performing cholecystectomy more frequently than in the past?
3. Have the results been better than when simple drainage was used?
4. In what cases do you consider cholecystectomy the operation of choice?

¹Jour. Am. Med. Assn., Aug. 26, 1916, LXVII, pp. 653-656.

5. What are the contraindications to its employment?

6. As a rule, how do you treat empyema of the gallbladder?

7. How does the mortality of cholecystectomy compare with cholecystostomy in your work?

Question 1: What percentage of cases of cholecystostomy have had a recurrence of trouble following operation?

The numerical percentage given by twenty-nine men varied from 1 to 33½ percent of failures. The average was 9.5 percent.

Coffey reported infrequent recurrences. LaPlace, 33½ percent. Judd, ". . . impossible to state, but a large number." Stanton found 14.5 percent recurrences in Ochsner's and his own cases.

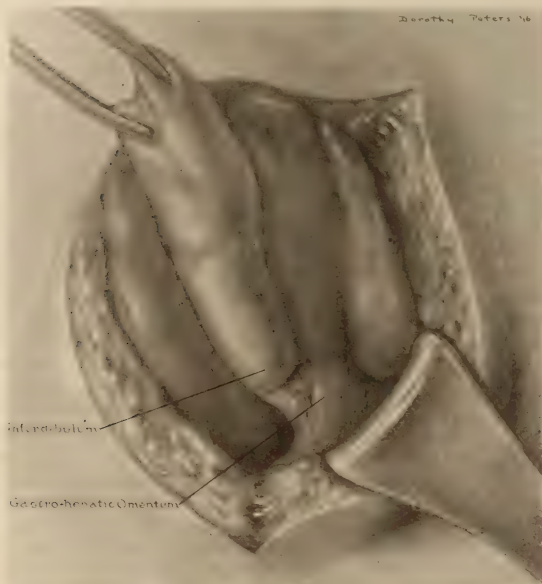


Fig. 1.—The liver and gallbladder are drawn out into wound; the infundibulum of the gallbladder is seen lying over the cystic duct and artery.

Question 2: Are you performing the operation of cholecystectomy more frequently than in the past?

There were forty-five answers—thirty-six affirmatives and nine negatives. Among those performing cholecystectomies more often were Bevan and Frazier, 80 to 90 percent; Elting, 60 percent; Gibbon, 50 percent; Clark, 33½ percent; Martin, more often, but considers it a more dangerous operation; Deaver, more frequently than formerly, but not so often as many surgeons; Crile, not much more often. In 1907 the Mayos performed 100 cholecystec-

tomies and 261 cholecystostomies. In 1915, 915 cholecystectomies and but 60 cholecystostomies. Some of the men not using cholecystectomy as often as cholecystostomy were Kelly, Bloodgood, Finney, Grant, and Cullen.

Question 3: Have the results been better than when simple drainage was used?

Thirty-six men answered yes; seven answered no; two failed to answer.

Question 4: In what cases do you consider cholecystectomy the operation of choice?

The chief indications for removal given by the majority are any disease of

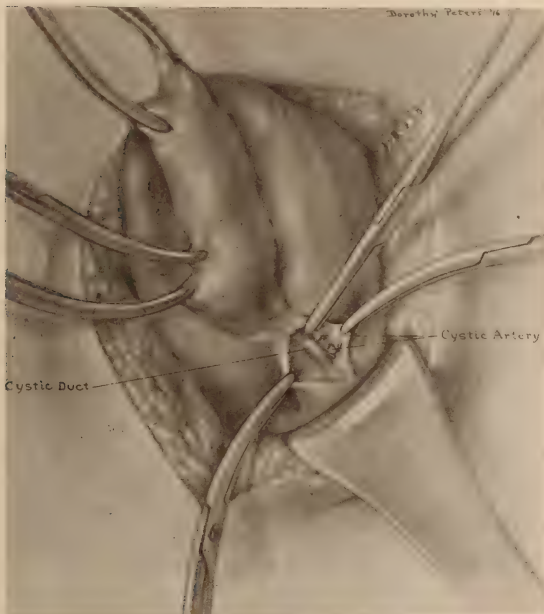


Fig. 2.—Infundibulum of the gallbladder lifted up away from the gastrohepatic omentum, exposing cystic duct and artery.

the wall of the gallbladder itself or damage to the cystic duct. Three surgeons prefer cholecystectomy in every case; two, in all cases except those complicated by pancreatic disease; 80 percent advise removal when any disease of the gallbladder wall, with or without stone, is found, mentioning as indications thick-walled, enlarged gallbladders; thick-walled, contracted gallbladders; adherent gallbladders; adhesions to the pylorus (Lund); gangrenous gallbladders; in early malignancy confined to the gallbladder itself. Kehr urges cholecystectomy as a prophylaxis in cases of chronic cholecystitis which prove rebellious to medical treatment. Several (Mayo, Judd, Lathrop, Gibbon,

and others) call attention to the possibility of systemic joint infection secondary to disease in the wall of the gallbladder, as pointed out by Rosenow, and advise cholecystectomy as a prevention.

Obstruction or obliteration of the cystic duct, either by stone or stricture, is the next indication advised by the majority. A few call attention to the liability of stricture of the duct following the removal of an impacted stone. Some of the conservative men think cholecystectomy indicated only in the presence of gangrene and suspected malignancy of the gallbladder itself. Kelly employs cholecystectomy only in thick, contracted gallbladders and malignancy.

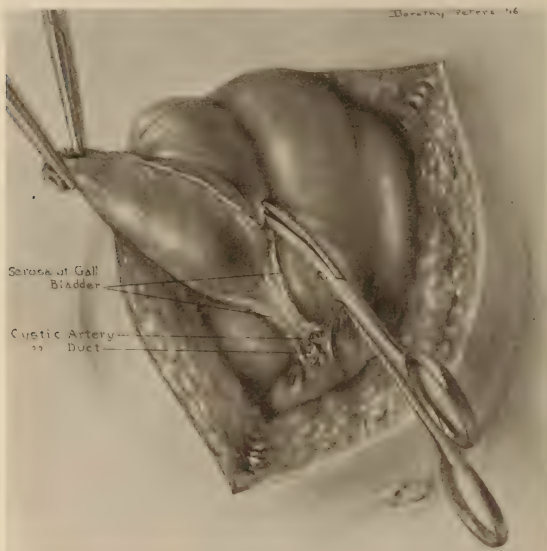


Fig. 2.—Cystic duct and artery ligated separately, gallbladder being dissected free from its bed, leaving a narrow strip of serosa.

Mayo Robson mentions (1) phlegmonous cholecystitis, (2) gangrene of the gallbladder, (3) chronic cholecystitis, (4) in mucous fistula or hydrops due to stricture of the cystic duct, (5) in empyema, (6) in cancer.

Deaver advises the operation of cholecystectomy for (1) hydrops from obliteration of the cystic duct, (2) calcareous degeneration, (3) the cholesterol gallbladder of Moynihan, (4) chronic empyema, (5) gangrene, (6) carcinoma limited to the gallbladder itself, (7) extensive laceration or perforation of the gallbladder.

Crile advises cholecystectomy (1) if the cystic duct is occluded, (2) if the cystic duct has a decubitus, (3) if the gallbladder wall is injured by disease.

Lilienthal gives all indications cited above, and concludes that it is his

belief that any gallbladder that is worth operating on may with advantage be removed.

Erdman says cholecystectomy limits morbidity and increases efficiency. As a result he is performing cholecystectomy in almost every case, although there are some cases in which cholecystostomy must be performed.

Crile believes that the clinical results of cholecystectomy are better than those of cholecystostomy, just as nephrectomy for a pus kidney is better than nephrotomy. He has never seen any adverse clinical results following excision of the gallbladder.

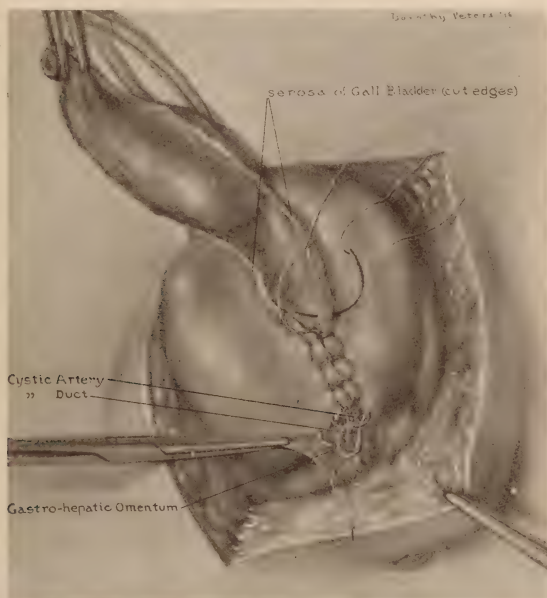


Fig. 4.—Split in gastrohepatic omentum being closed, covering cut ends of cystic artery and duct; suturing cut edges of serosa.

Babcock recommends cholecystectomy in the first stages of cholecystitis, but emphasizes many of the technical dangers.

C. H. Mayo says cholecystostomy and the removal of stones will cure symptoms of mechanical obstruction, but does not cure chronic cholecystitis and cannot restore the destroyed walls of the gallbladder or free it from adhesions. He advises cholecystectomy for these and for all cases in which infection is the major feature, with or without stones. Chronic pancreatitis with gastric symptoms cannot be cured by cholecystectomy, but requires prolonged drainage.

Question 5: What are the contraindications for cholecystectomy?

The chief ones may be said to be the following: Inexperience of the operator. Inexperience of the anesthetist; one who may not appreciate the fact that manipulations about the liver ducts may cause the patient to strain or cough, although fully anesthetized. Desperate condition of the patient, which will not permit any prolonged operation or any additional trauma. In the very obese, in whom good exposure cannot be obtained, or in the presence of perihepatic adhesions, which make it impossible to draw the liver well down and rotate it outward through the wound. Edema of the gastrohepatic omentum and swelling of the ducts, making it almost impossible to recognize them, is mentioned by some. Ochsner does not think it wise to operate on

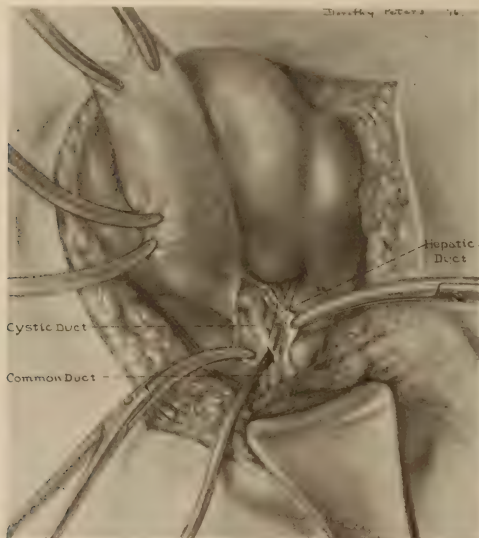


Fig. 5.—Drainage tube in hepatic duct. Note the close relation of the common and hepatic ducts to the infundibulum of the gallbladder and the ease with which these ducts may be injured in ligation of the cystic duct if the infundibulum of the gallbladder is not first lifted up, thus exposing to view the cystic duct and artery. See also Fig. 2.

any case in the very acute stage. Mayo Robson does not believe in removing the gallbladder if there is no patency of the common duct. Deaver advises passing a probe through the cystic duct, the common duct, into the duodenum in all cholecystectomies to make sure the common duct is patent. Porter advises against removing the gallbladder if there is the slightest chance that it may have to be used for future drainage. Frazier, Deaver, Mayo, and Crile advise against cholecystectomy in pancreatic disease and in acute empyema. Cholecystectomy is contraindicated in patients who have already had one major operation performed, as a hysterectomy or umbilical hernia repaired.

Question 6: As a rule, do you treat acute empyema of the gallbladder with cholecystectomy or drainage?

Forty-four men replied to this question. Thirty-three favored cholecystectomy.

Ochsner advises primary drainage and excision later, as do Werder, Stanton, Clark, and others. Elting feels that the gallbladder is only a part of a general infection and that drainage is needed. Bevan drains if the patient is very sick, but removes the gallbladder if the patient's condition is good or if the gallbladder is gangrenous.

Coffey does cholecystectomy in more than one half his cases. He believes the ones he drains should have the gallbladder removed later. Martin, Frazier, Haggard, LaPlace, Andrews, and Beckman favor cholecystectomy.

Judd writes: "No definite statement can be made as to the best procedure in acute empyema. This is a matter that must be left to the surgeon's judgment in the individual case. If we can do a cholecystectomy as safely, we prefer to do it, though many times we believe that a cholecystostomy should be followed later by a cholecystectomy." Deaver has the same advice to give.

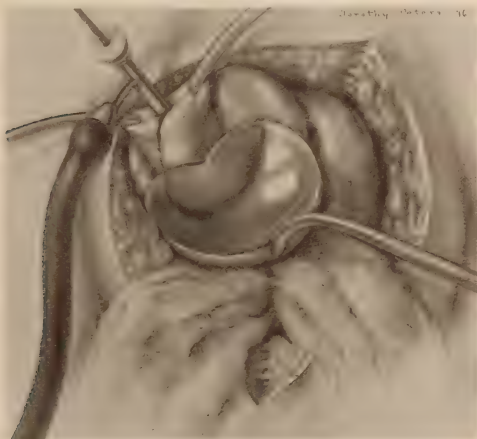


Fig. 6.—Drainage of gallbladder.

Question 7: How does the mortality of cholecystectomy compare with cholecystostomy in your work?

Among the forty-five answers to this question, two stated the difference in mortality was not known; four men's work showed a lower mortality for cholecystectomy than for cholecystostomy; eighteen reported the mortality the same for each operation; twenty-one had a higher mortality for cholecystectomy than for cholecystostomy (ranging from 0.5 to 3 percent).

It will be seen that most of these forty-five experienced men consider cholecystectomy a better operation than cholecystostomy—that its chief indications are any disease of the gallbladder wall itself or any injury to the cystic duct. It will also be seen that there are distinct conditions which demand drainage and not re-

moval, also that, in the opinion of the majority, acute empyema is best treated by primary drainage and removal later. The mortality in the hands of these experts was higher for cholecystectomy than for cholecystostomy.

Cholecystectomy is an operation, attended, I believe, with many more technical difficulties and dangers than simple drainage, and I regard it as a much more formidable one. Even in spite of good anesthesia, good assistance, the Bevan incision, good exposure cannot always be had, and the operation cannot be as safe as drainage if there is poor exposure (Fig. 1). The operative dangers, aside

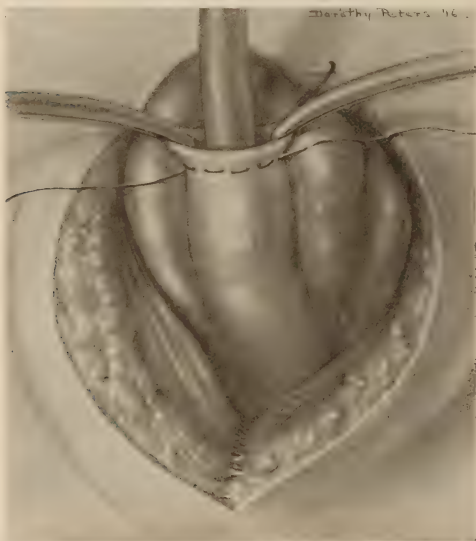


Fig. 7.—Purse string suture (first row) in the closure of gallbladder.

from shock are hemorrhage from the cystic artery, hemorrhage from the cut liver surface, requiring packs, and injury to the common or hepatic ducts.

Hemorrhage from the cystic artery may occur at the time of operation, or, later, from slipping of a ligature. Injury to the duct may be caused by clamping off the duct too close to the common duct, or by not appreciating the fact that the cystic duct often-times lies well up underneath the infundibulum or pelvis of the

gallbladder, and that the common duct may lie directly beneath the pelvis (Fig. 5).

As emphasized by Mayo and Judd, the folds of the gastrohepatic omentum should be split, the infundibulum of the gallbladder should be lifted up (Fig. 2) and separated from it by a dry gauze dissector, as advised by Mayo, or clamped by forceps, as advised by Deaver, to expose the cystic duct. It should be freed completely before it is clamped and cut. Before tying it off a probe is passed into the duodenum to make sure the common duct is patent. The artery is found, as a rule, to the inner side of the duct and above it (Fig. 2). It is tied separately (Fig. 3). The dissection is carried from below upward (Fig. 3), because the circulation is controlled from the start, and better exposure can be had by using the fundus of the gallbladder to hold the liver out of the wound.

Hemorrhage from the liver surface of the gallbladder bed can be prevented if the serosa is split in the long axis dissecting the gallbladder out of its fibrous coat so as not to trespass on the liver (Figs. 3, 4). If there is much infiltration of the walls of the gallbladder, it had better be removed in its entirety.

SUMMARY AND CONCLUSIONS.

Reports show that recurrences happen in 9.5 percent of cases that have had cholecystostomies performed. The recurrence of trouble following cholecystectomy is certainly small; the exact percentage is not known.

Cholecystectomy is employed much more frequently than in the past and is a better operation, but it is attended with many more operative difficulties and dangers than simple drainage. The gallbladder should be removed when its wall is diseased or the patency of the cystic duct is in question, provided the patient's condition will permit it.

The contraindications for the operation are critical states of the patient, acute empyema, infection of the ducts and pancreatitis, where drainage is desired.

It is safer to treat acute empyema of the gallbladder with simple drainage, and only proper to explain to the patient that a second operation may be necessary. Two safe operations are much better than one dangerous one, and in the case of doubt, simple drainage should be employed, especially by those inexperienced in gallbladder surgery.

OSTEITIS DEFORMANS, WITH REPORT OF A CASE.

By A. H. DEPPE, M. D., St. Louis.

G. H., age 48 years; married; musician.

Family History (informant wife).

Father: Died in middle age, of apoplexy; was a capitalist.

Mother: Died suddenly in middle age, from a heart condition.

As far as known, the patient has two brothers living; one brother fifty years old, a General in the Austrian army; and another brother, aged forty-five years, who has been an invalid since the age of seven, at which age he developed a tubercular hip and epilepsy. Two other brothers died in infancy, cause unknown.

Patient's grandfather and great-grandfather, and most of his uncles on his paternal side died of apoplexy, in middle age. As far as the patient's wife knows, there is no history of any constitutional diseases, or any condition similar to the one from which the patient is suffering.

Nothing is known of the family history on the maternal side.

Personal History.—Patient was the third child in order of birth, and was considered healthy. He had measles and mumps as a child.

He graduated from high school, and then studied music in various conservatories of Europe. Is considered a noted violinist, having been decorated by the King of Italy. He came to America at the age of nineteen years, and married at the age of twenty; lived with his first wife seventeen years, at the end of which time she divorced him on the grounds of incompatibility. There was one child, the issue of this marriage, who died from diphtheria at the age of seven years. Patient remarried at the age of thirty-seven. His present wife has known him for the past eighteen years. There is one child, aged eight years, still living, the issue of this second marriage; no history of any other pregnancy. This child was examined and found to be well developed, physically and mentally.

About the time of patient's second marriage his wife noticed that the arteries on both sides of his head were unduly prominent. One year subsequent to his second marriage patient noticed that the size hat he formerly wore was too small for him; he had worn a hat size 7 $\frac{3}{8}$. From this time each hat he purchased had to be of a larger size, and later he could only wear a hat a few months when it would become too small. For the past six months his hats had to be made to order.

Four years ago it was noticed that patient was gradually assuming a stooped position, so that at present in stature he is much shorter than his wife, whereas previously he had been one inch taller.

For the past year and a half the wife has noticed a deformity in patient's left upper arm. For the past seventeen years he has been gradually losing his hair.

Six years ago the patient developed a luetic infection, resulting in ulcerated tonsils, which had to be removed. One year later his hearing became impaired and has gradually grown worse, until at the present time it is with difficulty that he can hear.

Seven years ago patient's wife noticed a change in his mentality. He had always been considered very temperamental, with a tendency towards irritability. This irritability became very much more marked, and patient would go

into states of furor over nothing, showed a lack of affection for his wife, and manifested marked moral indiscretions. He also developed an indifference to his personal appearance.

Last April his mental condition suddenly became worse. He became slovenly in his personal habits, walked about the house naked, became very destructive, and showed a marked lack of interest in his profession, in which up to that time he had been deeply interested.

Physical Examination (November 13, 1916). Patient's general condition is very poor. Shows a recent loss of weight. Double inguinal hernia. Stands with his hands hanging limply by his sides, shoulders stooped, chin resting on sternum. The temporal arteries are very large and tortuous. Radials very palpable, and pulsation can be distinctly seen throughout the course of both brachials. The pulse is rapid and regular, rate 122 at rest. Heart dullness increased 1½ fingers to the left of the nipple line. Diastolic murmur heard over the aortic area. Nothing pathological is found in the respiratory system and abdominal organs.

At present his height is five feet six and three-quarter inches (at the time of his second marriage he stood five feet ten inches). The head shows a marked uniform enlargement. At a point approximately at the junction of the sagittal and lambdoid sutures there is a depression that will admit the tip of the index finger. Here a distinct pulsation can be felt. Zygomatic bones are very much enlarged. The inferior maxillary is thickened throughout. The lower jaw is prognathous.

The measurements of the head are as follows:

Circumference.	69	c.m.
Nasal occipital arc.	47	c.m.
Nasal-bregmatic arc	24½	c.m.
Binocular arc	41½	c.m.
Antero-postero diameter.	23	c.m.

Facial length from the root of the nose to the tip of the chin. 13 c.m.

There is a marked kyphosis in the cervico-dorsal region. The spines of the vertebrae in this region appear quite thickened. The scapulae are enlarged, the acromion processes are about twice their normal size and spines are about one inch in thickness. The clavicle shows uniform enlargement throughout. All the ribs, especially the lower five, are enlarged. The costal cartilages, however, do not appear to be ossified. The head of both humeri are enlarged, being about the size of a man's fist. The upper one-half of the right humerus is greatly enlarged and shows a bowing forward. The shaft of the entire left humerus is thickened, but especially so in the upper portion, and it also shows a bowing forward in the upper and middle thirds. The bones of both forearms and hands are not involved. When the heels are approximated there is a decided separation between the inner surfaces of both thighs, which gradually taper downward until opposite the internal condyles there is a separation of about eight c.m. The crests of both illii are much thickened, and the head and upper third of both femuri are much enlarged. The lower two-thirds of the left femur appears thickened. The bones of the lower legs and both feet are not involved.

The right pupil is smaller than the left; they are both regular and all tendon and superficial reflexes were normal. No pathological toe signs. The backward movement of the head is limited. The arms can be abducted only to the level of the shoulders.

Mentally the patient shows marked deterioration, and his mental condition has been diagnosed as paralytic-dementia.

The Wassermann reaction on his blood was positive +++ and the spinal

fluid was positive +++. Nonne Apelt and butyric acid tests were positive, and there is a cell count of 29.

The differential count in the blood is as follows:

Polymorphonuclears 61 percent; large lymphocytes 5 percent; small lymphocytes 24 percent; eosinophiles 6 percent; basophiles 4 percent.

There is nothing abnormal in the urine. Specific gravity was 1020. Because of mental condition we were unable to estimate quantity voided in 24 hours, but it did not appear that there was polyuria.

SUGAR TOLERANCE TEST.

Time	Percentage of sugar in urine	Percentage of sugar in blood
Before test meal.....	0	.098
1 hour after meal.....	—	.160
2 hours after meal.....	4.1	.174
3 hours after meal.....	—	.154
4 hours after meal.....	3.3	.154
5 hours after meal.....	—	.142
6 hours after meal.....	1.6	.140
7 hours after meal.....	—	.140
8 hours after meal.....	—	.100

The test meal consisted of 200 grams of dextrose.

Paget's Disease or Osteitis Deformans was first described by Paget in 1874 in a report of five cases, with pathological examination of one. Five years later he reported seven additional cases, and up to 1889 saw eighteen additional cases, making a total of twenty-three cases seen by him.¹

Since this time and up to 1915 I have been able to find reported two hundred and thirteen cases, the last ones being reported by DaCosta, Funk, Bergeim and Hawk, in a report of five cases. From the small number of cases reported it can readily be seen that the condition is a rare one. Hurwitz found only three cases in over thirty thousand admissions to Johns Hopkins Hospital. The ones reported by DaCosta are the only five cases encountered in over thirty thousand admissions during the last seven years to the Jefferson Hospital.

Paget described this condition as a disease which begins usually after middle life, progressing slowly, and characterized by pains in the bones, marked deformities, particularly enlargement of the skull, the clavicles, cervico-thoracic kyphosis, bowing of the lower extremities forward and backward. A pathological examination of his first case was made and he came to the conclusion that the disease was a chronic inflammation of the bones.

Regarding etiology, there have been very few etiological suggestions. Lues, cancer, arterio-sclerosis, nervous lesions and gout have been mentioned. In one case reported by Hurwitz,² a history of trauma is present, and in cases reported by Packard and Steele and in one of Paget's original cases, there is also a history of trauma. Richard, in 1897, advanced the view that osteitis deformans was

closely related to arthritis deformans, and he tried to distinguish three forms of arthritis deformans:

First: those cases in which there are no lesions of the joints as described by Paget.

Second: cases in which the shafts and the joints are affected.

Third: cases in which arthritis deformans is associated with osteitis deformans.

Although in a few instances these two diseases may have co-existence there is no reason for assuming any definite relationship between them.

Several investigators have tried to find an etiological factor in the nervous system. In a few cases lesions of the central nervous system have been demonstrated at autopsy, the lesions consisting of a degeneration of the tracts of the spinal cord. Giles de Tourette and Marenesco in 1885, and Levi in 1897, reported two cases with findings in the nervous system. The cases, however, in which lesions of the nervous system have been found are so rare that in all probability the nervous findings are merely a coincidence, as careful study of the nervous system in many other cases has been made without finding any lesions. Lancereaux still adheres to the view that diseases of the nervous system play an important part in osteitis deformans. He bases his views upon the fact that the bones in this condition present the same characteristics as are seen in the bones of an extremity after sectioning the nerve governing that extremity. Schiff has demonstrated that section of the sciatic and crural nerves in young dogs is followed in three or four months by the thickening of the tibia, fibula, and bones of the feet. The medullary canals are obliterated and osteophytes develop on the surfaces of the bones. In older animals an osteoporosis develops at first and later on hypertrophy of the bone occurs. These experiments have been confirmed by Vulpian, but he calls attention to the fact that changes in a bone do not invariably follow section of the nerves.

Within recent years a number of French writers have advanced the view that this condition is a late manifestation of hereditary lues, basing their conclusions on a history of syphilis and a Wassermann reaction in several cases; but this theory has been discredited by the careful differentiation between clinical and radiographic pictures of the two diseases.

The role that the glands of internal secretion play in this condition must be considered. That disorders of bone metabolism, may occur as a result of perverted action of certain ductless glands is well known to us. We are well aware of the association of acromegaly and giantism with diseases of the pituitary. We are also aware of the importance that the parathyroids play in controlling calcium metabolism, and DaCosta³ and his associates made a complete metabolic study of two of their cases and found a retention of the calcium,

magnesia and phosphorus, and a pronounced loss of sulphur. Paget in making a chemical analysis of the bones of the skull and tibia in his first case found a reduction of the inorganic salts. In one of the cases reported by DaCosta the x-ray shows a calcareous deposit in the region of the pineal gland about the size of two grains of wheat. Higbee and Ellis⁴ reported a case in which a pathological study was made where they were unable to find any parathyroids, the thyroid being very small and showing regressive changes, and also containing a few areas resembling parathyroid tissue. Levi⁵ found extensive sclerosis of the thyroid. Hudelo and Heitz⁶ found the thyroid sclerosed and atrophied and the adrenals sclerosed. Pescarolo and Bertolotti⁷ found the thyroid enlarged and the pituitary hemorrhagic enlarged. Lyons⁸ found the thyroid atrophied and also found clinically that the pain was relieved by pituitary medication. Gruener, Scrimger and Foster¹⁰ found the thyroid, adrenals, prostates and testes, and especially the pituitary body, atrophic.

Heredity as an etiological factor has long been considered by some observers. Paget was unable to find any trace of inherited tendency. Since this time there have been about a dozen cases reported in which the disease occurred in more than one member of a family. Pick¹¹ reported the disease in father and daughter; Smith¹² in father and son; Higbee and Ellis¹³ in mother and son; Stahl¹⁴ reported the disease in two sisters; Perry¹⁵ also reported it in two sisters; Hurwitz¹⁶ in one of his cases reports sufficient evidence for believing that the disease was present in the patient's mother. However, the number of cases in which family history exists is too small to justify any definite conclusions as to the part heredity plays.

From a pathological standpoint very little has been added to our knowledge of the pathogenesis since it was described by Paget.¹⁷ Paget believed the process to be of an inflammatory nature and laid particular stress upon the inflammatory absorption of bone associated with the formation of lacunae, and he believed that the fibrous character of the bone marrow to be the result of the long duration of an inflammatory process. He also called attention to the apparent increase in the vascularity of the affected bones as evidenced by the large blood vessels of the periosteum and bone.

Stilling believes that the primary process is a rarifying osteitis. Higbee and Ellis state that the reabsorption of bone appears to be the initial histological recognized change. According to these observers the reparative process alone should be regarded as of an inflammatory nature, which follows the reabsorption of the bone and which results in new bone formation. Packard, Steele and Kirkbride picture the process as follows:

1. Absorption of the compact substance causing enlargement and confluence of the Haversian canals.

2. Formation of new bone which runs diffusely through the affected and the adjacent healthy portions; the new bone remains uncalcified and is in turn absorbed.

3. The conversion of the medullary substance into a vascular connective tissue containing fat cells, giant cells and leucocytes. In a small proportion of the reported cases cysts filled with a gelatinous material and giant cell sarcomata occurred in the medulla.

4. As a consequence of these processes the ordinary relation of the compact substance and the medulla are destroyed. The bones becomes exceedingly thickened and asymmetrical. But since the new bone tissue remains uncalcified, its elasticity permits great deformity of the long bones from the weight of the body.

What has been said of the microscopical changes observed makes clear the varied pictures which the disease presents. At first the bones are soft and yield to strain and weight, causing the deformation, and after a few years they become hard and the deformity becomes permanent.

Von Ricklinghausen described a condition which he calls Tumor Bildenden Osteitis Deformans in which there was regressive changes of the fibrous marrow into gelatinous cysts leading to the formation in the long bones of small brown and red tumors of the nature of giant cell sarcomata. Later investigators, however, claim that the condition described by Von Ricklinghausen and osteitis deformans could not be differentiated histologically, and have reported cases of osteitis deformans with tumor growths which would tend to bring into close relationship Von Ricklinghausen's tumor forming osteitis and Paget's disease. Gruener, Scrimger and Foster¹⁹ report a case of multiple sarcoma formation, and from literature we are able to collect sixteen cases associated with tumor formation.

Symptomatology.—Since Paget's description and his original communication very little has been added, and his description being so clear, I should like to quote him:

"The disease begins in middle age or later. It is very slow in progress and may continue for many years without influence on the general health, and may give no other troubles than those which are due to the changes of shape, size and directions of the diseased bones. Even when the skull is large, thickened, and all the bones exceedingly altered in structure, the mind remains unaffected. The disease affects most frequently the long bones of the lower extremities and the skull, and is usually symmetrical. The bones enlarge and soften, and those bearing weight yield and become unnaturally curved and misshapen. The spine, whether yielding to the overgrown skull or by the changes in its own structure, may sink and seem to shorten with greatly increased dorsal and lumbar curves. The pelvis may become wide, the necks of the femur may become horizontal, but the limbs however misshapen remain strong and fit to support the trunk. In its earlier periods and sometimes through all its course the disease is attended by pains in the affected bones, pains widely varied in severity and variously described as rheumatic, gouty, or neuralgic, especially nocturnal or periodical."

Later reports, however, seem to indicate that the disease is not necessarily symmetrical. Levi reports a case in a woman 62 years of age in which the disease developed more in the bones of one side of the body than the other. Cases have been reported in which only one bone was involved, especially the tibia. Hurwitz²⁰ reports a case occurring in the right femur, and found a record of five or six cases in which only one bone was involved, and found it referred to by some observers as mono-osteitis type.

The bones are most frequently involved in the following order: Tibiae, skull, femora, pelvis, spine, clavicles, ribs, radii.

Paget does not refer to the bones of the face being involved, but Marie reports a case in which zygomata and jaw bones were very much thickened and squeezed the healthy teeth out of the jaw.

Paget also lays particular stress upon the pain element as a constant symptom, but Joncheray²¹ distinguished two varieties with regard to pain, a painful variety and a painless variety. The painless variety is the more frequent.

Regarding the mental symptoms Paget claims that the mind remains free no matter how altered the skull may become. Fitz,²² however, reported a case in a woman showing marked mental symptoms characterized by irritability and later vague delusions and hallucinations.

There are certain bone conditions from which osteitis deformans must be differentiated:

1. Acromegaly.—In this condition the bones of the face are hypertrophied while the cranial bones are not involved. There is also hypertrophy of the bones of the hands and feet with little or no involvement of the long bones.

2. Osteomalacia.—The bones are soft but not hypertrophied; and in osteitis deformans one does not find areas of decalcification of the bone tissue which is characteristic of osteomalacia; and according to DaCosta the metabolic picture of osteitis deformans is, to a certain degree, the reverse of that seen in osteomalacia.

3. Rickets.—This is a disease of growing bones in which changes occur chiefly in the zone of growth and the ends of the long bones.

4. Leontiasis.—Involves only the head and the face and anatomically the bone tissue is markedly sclerosed.

5. Senile Osteoporosis.—There is a kyphosis of the thoracic spine and bowing of the legs but no hypertrophy of the bones and no deformation of the skull, clavicles and bones of the upper extremities.

6. Syphilitic Osteitis.—

- a. In acquired syphilis the bones of the cranium are more frequently involved than the long bones. In congenital syphilis where the bones of the tibiae are most frequently the site of the disease, the patients are young; while in osteitis deformans the patients are middle aged.

- b. The bones in syphilitic cases, in addition to the general enlargement, often have irregular bosses on their surfaces.
- c. In syphilitic diseases the pain is constant, worse at night, boring in character. In osteitis deformans the pains present no constant characteristics.
- d. In most cases of syphilis of the bone an improvement under treatment takes place, while in osteitis deformans there is no change.
- e. Radiographically the two diseases can be differentiated.

In conclusion there are certain things to which I wish to invite attention in the case I have reported

In the first place the involvement of the bones of the face, which is present in this case, to which Paget does not call attention, but which has been reported in several cases by Marie. Also to the absence of pain during any stage of the disease while, according to Paget, it is always constant. Also to the marked history of arteriosclerosis on the paternal side.

To me the most interesting feature of this disease is the etiology. The fact that this patient contracted lues after the onset of the condition I think is sufficient evidence that lues as an etiological factor can be ruled out. From our knowledge of the relation of certain glands of internal secretion with disturbance in bone metabolism it seems evident that the disturbance in these glands should be carefully sought after. In the last several years knowledge of the relationship of various ductless glands to the disturbance in bone metabolism has been carefully studied with the result that investigation of the glands of internal secretion, at autopsies held on this disease, pathological changes have been found in these glands in numerous cases.

The disturbance in sugar tolerance which has been demonstrated in this case tends to show disturbance in the pituitary function; but this one case not being sufficient from which to draw conclusive deductions, it is to be hoped that it will be investigated further by other men in their cases.

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EXOPHTHALMIC GOITER—INDICATIONS FOR SURGICAL INTERVENTION—CHOICE OF PROCEDURE.*

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This paper is limited to the consideration of exophthalmic goiter. Though having the sanction of established usage, the term is an unfortunate one, since exophthalmos is neither a constant nor an essential feature. Hyperthyroidism and thyrotoxicosis are much to be preferred as designations as each of them, in conformity with the rules of medical nomenclature, definitely links the disease with the organ chiefly at fault.

The occasion will not permit of more than reference to the vastly interesting problems of etiology and pathology. It seems very certain that the primary function of the thyroid gland is the elaboration of an iodine-bearing chemical agent which plays an important part in the regulation of the vital processes and that overactivity of the gland is a constant and necessary factor in the production of exophthalmic goiter. This is demonstrated by the prompt effect of surgical reduction of the output of the gland. It is equally clear that the most conspicuous and doubtless the most important cause of hyperfunctioning of the gland is psychic in character. The cases of exophthalmic goiter have been very few in my experience in which it was not possible to obtain a definite history of emotional upset, i. e., anxiety, fear, sorrow, business strain, etc., and we all recognize that even after the most successful surgery, if the benefit is to prove lasting, these are the influences from which our patients must be protected by prolonged rest, change of environment, and careful regulation of their habits of life.

The fact has often been commented upon that Graves' disease in its clinical manifestations closely resembles the acute infectious diseases. So striking is the similarity that some writers have even ventured to affirm their belief that a specific bacterial cause of the malady will ultimately be demonstrated. For the present, at least, this question must be considered merely speculative.

That a certain relation not infrequently seems to exist between an acute infectious process and the inception of toxic goiter, or an acute exacerbation of a dormant case, can not be disputed. But that the specific infectious agent in such cases is *per se* the cause of the goiter or of the exacerbation does not follow. The numerous cases

*Read before the California State Medical Society, San Diego, April 19, 1917.

of true exophthalmic goiter known to develop independently of any infection, rather serve to disprove a causative relation.

With reference to pathology, it may be said without hesitation that there is no special or invariable type of histologic change in the thyroid which may be accepted as characteristic of exophthalmic goiter.

The distinction made between the term 'hyperthyroidisms' and 'thyrotoxicosis' in the writings from the Mayo clinic is a rather positive one, hyperthyroidism being described as the type of the trouble characterized by *hyperplasia* and applied exclusively to exophthalmic goiter, thyrotoxicosis as characterized by *hypertrophy* and applied to other types of toxic goiter. On the other hand Crile maintains that hyperplasia is found in only 50 to 75 percent of the cases of exophthalmic goiter operated on at Lakeside clinic. I am not sufficiently well versed in the lore of pathology to explain the difference between the hyperplasia and hypertrophy which give rise to identical symptoms. Clinically this seems to be another instance of a distinction without a difference.

It is true hyperplasia of some degree is found in majority of cases. But it is a well-recognized clinical fact that as marked benefit may follow surgery in this disease, when a colloid goiter is removed, or an adenoma excised, as when the pathology consists solely of hyperplasia. Again, as negative evidence may be cited the numerous cases of hyperplastic thyroids encountered daily in every community in which no symptom of exophthalmic goiter is presented.

We are forced, therefore, to conclude that the pathology of Graves' disease is not to be found in the thyroid alone, but that other organs and other factors are implicated, even though we may not be able to demonstrate it in the laboratory. Those interested in this phase of the subject will find pleasure as well as profit in the study of Crile's fascinating kinetic theory which affords the most luminous explanation yet advanced of both etiology and pathology.¹

INDICATIONS FOR SURGICAL INTERVENTION.

Surgery is indicated in every case of exophthalmic goiter. The only question to be considered in this connection is the time at which it shall be applied.

While certain symptoms are fairly constant and distinctive of the disease, no one of them suffices for diagnosis, much less for the determination of treatment. It is necessary, therefore, to study the symptom-complex in each case and, more particularly, to inquire with impartial judgment into the nature and extent of the secondary changes produced.

¹Man—An Adaptive Mechanism.

It is true, unfortunately, that in the majority of these cases when first seen by the surgeon the problem presented is not so much one of diagnosis or of possible cure as of one of saving life; for usually the resources of non-surgical treatment will already have been exhausted and the damage wrought by the disease be found irreparable.

Death in Graves' disease is due primarily to the heart complications. The toxic output of the over-active thyroid seems to expend its chief force upon this organ, many of the group of minor symptoms being merely secondary to the cardiac involvement. In fatal cases myocardial degeneration, with or without valvular lesions, is a constant autopsy finding.

Tachycardia is the one symptom-phenomenon upon which both the diagnosis and the indications for surgical intervention may be said to rest. A persistent tachycardia which can not be otherwise accounted for justifies at least a tentative diagnosis of hyperthyroidism, and a persistent tachycardia which can not be otherwise controlled justifies at least the serious consideration of surgery.

It can not be too strongly emphasized that, when the indications for surgical interference are sufficiently clear, no delay not absolutely imperative should be countenanced. It should be understood that the object of surgery in these cases is not only to save life, but also to prevent permanent damage and so permit of the restoration to normal health. This is a point of supreme importance in view of the fact that the surgeon is rarely consulted when the disease is in its early stages.

CHOICE OF PROCEDURE.

When it has been definitely determined that operative interference is called for, the vital question remains to be decided as to what procedure is best adapted to the case in hand. In favorable cases the radical operation—lobectomy—is always to be preferred. But because of the time required and because of the extensive surgery involved, this procedure cannot always be safely chosen. Many factors enter into the decision of the question which may be tersely summarized in the reminder that it is a patient, not merely a goiter, that is to be dealt with.

To be specific on this point, in my judgment, radical operation as a primary procedure should not even be considered in any case in which the heart action can not be brought down to or below 100 beats per minute, regardless of the presence or absence of secondary changes in the heart itself.

Ligation of the superior thyroid arteries is so simple and relatively so free from danger that it should be the procedure of choice in every case in which there is doubt as to the safety of the radical operation. The results of this procedure are sometimes truly

astonishing, the heart action dropping from 130 or 140 to 80 or 90 beats per minute in 48 hours and other symptoms quieting down proportionately. As a rule the beneficial effects are soon quite evident and after a few weeks the radical work may be undertaken with every assurance of success.

A word of caution should be uttered here. Crile's dictum that " . . . it is the first surgical contact which kills these patients," should always be borne in mind. Still, I believe that fewer lives will be lost by prompt ligation, in these highly toxic cases, than by the practice so often followed of adopting nonoperative expedients and waiting for subsidence of the dangerous symptoms.

The next procedure I mention only to disapprove, i. e., the injection of boiling water into the substance of the gland. This method of treatment was formerly much in vogue and still has its advocates. But it seems to be the opinion of those of largest experience that in the aggregate it is attended by greater proportionate danger than either single or double ligation. For instance, in 386 cases reported by Mayo and Plummer² hot water injection was employed 22 times with 2 deaths, double ligation 19 times with no deaths, and single ligation 388 times with 2 deaths.

While not strictly a surgical procedure, a word with reference to the use of the x-ray in exophthalmic goiter may not be out of place. The x-ray is not curative. There can be no question that for a time the vascularity of the gland may be diminished and its toxic output controlled, but the improvement is only temporary. If a cure is to be effected surgery will ultimately be demanded. Anyone who has performed the radical operation subsequent to the application of the x-ray does not need to be told of the increased difficulties encountered due to adhesions, obliteration of the fascial planes, adventitious blood-vessels, etc., all of which mean increase in the time required and consequently increase in the danger.

CONCLUSIONS.

Exophthalmic goiter is always a surgical disease. I do not mean that every case should be subjected to operation as soon as the diagnosis is made, but that every case is to be regarded as potentially surgical and its treatment conducted with that idea constantly in mind. The analogy between appendicitis and Graves' disease in this respect is a very close one. It is now universally accepted that appendicitis is never other than surgical. My plea is for a similar conception of exophthalmic goiter. The immediate mortality resulting from the latter under the so-called medical plan of treatment may be proportionately less than in the case of appen-

²Lancet-Clinic, 1915.

ditis, but the morbidity and permanent disability are certainly greater.

While the exceptional case of exophthalmic goiter may apparently recover without operative intervention, in the aggregate many lives will be saved and much suffering and impairment of vital organs prevented by recognizing that the disease is to be classed as surgical from the beginning and throughout its course. For surgery offers the only promise of definite cure known at the present time. Within the past few months I have operated on three patients past 50 years of age, each of whom had suffered from the trouble for 20 years or more and all of whom had at times thought themselves cured by other means.

LOCAL TREATMENT OF ECZEMA OF THE EYELIDS.

BY DOUGLASS W. MONTGOMERY, M. D., San Francisco.

Eczema of the eyelids presents peculiar difficulties to treatment because of its violence, its refractoriness, its tendency to recur, and also because of the proximity of the delicate mucous membrane of the eye.

The most frequent eczema of the eyelids is that usually called blepharitis marginalis. It is almost always, as its name indicates, confined to the edges of the lids. It often also runs along the cutaneous wrinkle, which extends outwards from the external canthus. It is seborrheic in character, and therefore is associated with other symptoms of seborrhea such as a thick, oily or furfuraceous skin, with acne, rosacea, comedones or all of them together. It also occurs in those young persons with soft muscles and with a delicate white skin, with a fallacious bloom of health who are designated as having a lymphatic diathesis. It was observation of this that probably gave rise to the idea that blepharitis marginalis was a symptom of scrofula, as those having a lymphatic diathesis are peculiarly liable to tuberculosis and to tubercular lymphadenitis.

Blepharitis marginalis may be a very slight affair, hardly noticed by the patient himself, or it may be so prominent as to constitute a facial deformity. It often forms crusts on the lashes, which the patient is always picking off, and this may be the only form of subjective irritation, or occasionally it may be very itchy. The coincident coccogenic catarrhal inflammation often runs down into the ciliary follicles, and causes atrophy and permanent fall of the eyelashes, or may enter the Meibomian glands, causing styes. After long residence the disease may induce atrophy of the connective tissue with ectropion or entropion and consequent deviation of the eyelashes, which when directed inwardly constantly sweep the conjunctiva and give rise to traumatic conjunctivitis. Other than this it is surprising how infrequently this form of eczema is accompanied by granular conjunctivitis.

The favorite local treatment is an ointment of yellow oxide of mercury from one to five percent in strength. One of the essential qualities of the ointment must be its smoothness, secured by prolonged trituration. It is for this mechanical reason that many of the ointments prepared by the large drug firms are so excellent. The pomade is applied either by wiping it along the eyeslit with the little finger and then rubbing with the back of the middle

knuckle of the index finger, or by applying the salve with a fine camel's hair brush or with a roll of silk paper. For the sake of cleanliness it is desirable to dispense the salve in a collapsible tube.

The red oxide of mercury is much employed, and it seems to me that it is the milder preparation, although it is crystalline and the yellow oxide is amorphous. The crystalline form, though its angular character, should be more irritating, but it is very doubtful if it really is so.

The probable mode of action of these oxides of mercury is interesting. The oxygen is bound very loosely to the mercury—a low red heat will decompose to HgO driving off the O as a gas. In fact it was from red precipitate or precipitate per se, as it used to be called, that Priestley obtained the oxygen, which he discovered in August, 1774. Chlorine has a much stronger affinity for mercury than oxygen, and the chlorine of the sodium chloride of the warm alkaline tissue juices and tears displaces the oxygen of the HgO and forms nascent HgCl_2 , which in turn links up with the albumen present and is swept away, so that the bichloride of mercury rarely accumulates in large enough quantity to cause any irritation. This nascent bichloride of mercury, therefore, forms an effective and as far as the tissues are concerned, innocuous antiseptic.

Calomel ointment (2 percent) sometimes agrees better than ointments of the oxides of mercury. In the warm alkaline tears and other secretions loaded with sodium chloride, some of the calomel changes into the bichloride of mercury, and therefore eventuates similarly to the oxides of mercury.

Camphor acts soothingly and protectingly on an irritated cutaneous or mucous surface, and also acts as an antiseptic, and one or two percent of it may be added advantageously to the above ointments of calomel or of the oxides of mercury.

Watery solutions of the cyanide or the bichloride of mercury (1-10,000) may be advised in cases, for instance, in which the integument has a natural intolerance for grease. In any skin disease in which an ointment inexplicably disagrees this intolerance for grease must be considered and inquired into.

Nitrate of silver solutions (1 percent or 2 percent) well brushed in are often excellent, but they discolor so badly that they are seldom prescribed. Argyrol is less active. It is not irritating, it is soothing, and one of the factors in its soothing effect is due to its changing the tonicity of the water employed. This important question of tonicity and osmosis will be taken up later.

By far better than the above solutions of the cyanide and the bichloride of mercury is a warm or hot solution of boric acid. A compress may be dipped in a saturated solution of boric acid and laid across the eyes, and covered with rubber tissue or oiled

silk to lesser evaporation and the consequent loss of heat. A still better way to achieve a result is to add two heaping tablespoonfuls of boric acid powder to an ample wash bowl of hot water, and have the patient seat himself in front of it, and bathe the eyes with a towel folded a number of times. The large quantity of water has a decided advantage as it retains its heat, and hot water may be turned in from the tap from time to time to keep up the temperature. Sometimes boric acid renders the skin dry and harsh, and therefore it may have to be abandoned.

Erythematous eczema of the eyelids differs decidedly from blepharitis marginalis, which tends as before mentioned to be sluggish and of low grade. Erythematous eczema on the other hand is usually active and stormy. Indeed it is so touchy and so intolerant of remedies that there are those who assert that it will tolerate nothing but cold cream. Something more than this, however, may be done to mitigate the asperities of the disease, and the greater the need the greater the gratitude for help extended.

This erythematous eczema may be a part of erythematous eczema of the face, or the eczema may be confined to the eyelids or even to the lids of one eye, as in a case which will be mentioned later.

The dephlogisticating effect of hot water applications may here be also employed with excellent results. Something should also be added to the water to increase its specific gravity, and to render it hypertonic, as otherwise it would act osmotically and detrimentally on the congested papillary layer of the skin.

The valuable quality of hypertonicity is one of the reasons why many of the vegetable infusions, such as camomile tea, have so long enjoyed a reputation as remedies for eczema. If the added substance is antipruritic and soothing the efficacy of the lotion is much increased, and it is on this account that a mixture of lead water and coal tar emulsion often acts admirably, as, for instance:

R Liq. plumbi subacetatis..... ½ ounce
 Liq. carbonis detergentis..... 2½ ounces
M. Sig.: A teaspoonful in a pint of hot water to use as a lotion.

I have often heard it said that lead water should not be employed in this region. I see no reason either clinically or scientifically why it should not be, but it should be very dilute. In the above prescription it is very dilute indeed—a sixth of a teaspoonful to a pint. In acute eczemas it acts wonderfully well, and its action may depend upon the CO_2 of the tissue juices displacing the acetic acid radical and forming carbonate of lead, PbCO_3 , just as it does in the manufacture of white lead. The carbonate of lead is a moist, dense, soothing, bland salt, which the older chemists with their fine appreciation of qualities used to call "mineral wax."

In the intervals of the application of these lotions the previously

mentioned yellow oxide of mercury or calomel ointments may be used, or an ointment of the red oxide of mercury (1 percent) may be employed. These mercurial preparations are all antipruritic. It is not well to employ the ammonio-chloride of mercury on the eyelids, as it is too stimulating.

Zinc oxide ointment may be harsh and drying, a particularly disagreeable feature on a cutaneous surface that is so rapidly and so continuously in motion.

Ointments may act badly for two reasons: some skins, as before mentioned, are intolerant to grease, and in very active hot eczemas the grease, by interfering with the escape of secretions and radiation of heat, may act heatingly instead of being cooling and soothing. The employment of cold creams as bases sometimes overcomes these objections because the evaporation of the water cools and soothes the inflamed surface. Pastes are sometimes superior even to cold creams in this respect.

Pastes are ointments, but contain by far more powder; usually the powder is equal in weight to the grease or unctuous substance employed as a base. The large amount of powder changes the character of the application and permits it to absorb exudates, and it does not retain the heat to the same extent as an ointment, and is therefore much more comfortable and often more curative. Usually, however, when the paste is made with vaseline of any of the ordinary ointment bases the preparation is too concrete and stiff for the highly flexible surface, and it may cause drying and cracking. This may occur even when the base is cold cream. There is, however, one paste deserving of special mention, made with naftalan.

Naftalan is not the substance out of which moth balls are made (Naphthalene). It is a black greasy material of the consistency of vaseline and of a peculiar odor, made from a coal tar mined in Southern Russia. It has become practically unattainable since the war. It is of especial value in acute eczema; for instance, in infantile eczema.

Not long since a young man applied for treatment for a troublesome eczema of the cutaneous surface of the right eyelids. It would subside for a short time, but would instantly return on resuming his work as a bank clerk. His oculist could find no cause for it in the eye itself. I happened to have some naftalan, which I had reserved for emergencies, and a paste made with it acted better than anything that had been tried. In fact this and an outdoor life shielded him completely from attacks and ultimately led to a cure. The paste was made as follows:

R	Amyli	
	Zinc oxidi, āā.....	12.50
	Naftalan	25.00
M.	Sig.: Use on the eyelid twice a day.	

The common calamine lotion, made of two drams each of calamine and oxide of zinc in four ounces of rose water, may be effective. From time to time a patient comes to the office with an erythematous eczema of the lids, which is a cutaneous reaction from obstinate constipation. This calamine lotion is found to be the best application in her case. One of its good qualities is that being pink it is comparatively invisible.

There remains to be mentioned an instance in which eczema does not occur on the lids when naturally it would be anticipated. In infantile eczema the child may have an intense impetiginous eczema of the forehead, cheeks, and chin with absolute freedom of the eyelids, and probably also of the surface around the mouth. It gives a curious masklike look to the face.

The acute dermatitis of the eyelids so frequently observed in poison oak, primula poisoning, and from hair dyes (paraphenaline diamine) receive the same local treatment as erythematous eczema.

THE RECEPTION OF A CONVOY OF WOUNDED AT OUR AUSTRIAN RESERVE HOSPITAL.

By RALPH BOERNE BETTMAN, M. D., Chicago.*

The advent of a convoy, no matter how many others have come before it, is always a matter of interest in any base hospital. The rapidity and ease with which it is disposed of is one of the best criteria of the hospital's efficiency.

The cases we received in our Vienna base hospital never came directly from the front, but from some other base hospital nearer the firing line. Our cases had often been en route for three days, during which time, though, they had as a rule several changes of bandages.

The first notice we received was always a telephone communication from the "Sanitäts Chef" that at a given time a convoy of from 10 to 150 stretcher cases would arrive. The physician and military officer of the day were notified and these two were responsible for the transport. We always had at least two physicians, usually more, to receive every transport, no matter how small. Our transport was received in one wing of the building, and none of the wounded entered the main part of the hospital until they had been admitted, scrubbed and bandaged and were ready for bed. The soldiers who ran the furnace were notified to have the wing heated, and have a plentiful supply of warm water on hand. The cook was told the number for which to prepare, the officer in charge of the linen room laid out a sufficient supply of blankets, slippers, nightgowns, etc., the clerks prepared their lists of vacant beds, the nurses needed were given hours; the physicians who did not stay in the hospital for the transport left telephone numbers, all of which having been done, the hospital routine continued.

The honk honk of the automobile horns (a rare sound in Vienna these days) proclaimed the arrival of the ambulances long before the sentries report. In a few minutes the quiet courtyard was transformed into a bustling scene of activity. A dozen or more large auto-ambulances arrived, lined up in rows facing the doors of the receiving hall. Each ambulance carried two stretchers. The stretcher bearers lifted the stretchers from the ambulances and carried them into the hall, depositing the mangled remains of the once "physically fit," in cots which lined the walls, or seated them on the long benches in the middle of the hall, depending on the

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degree of their injuries. It was a grewsome sight and no less horrible even after its frequent repetition had made it familiar. The empty stretchers returned to the ambulance, the automobile immediately made place for another. As soon as the patient had been placed in his cot he was given a large bowl of hot soup, two small rolls of white bread—a great delicacy—and a cup of coffee. It would certainly have required a hard heart not to have been affected by the sight of these young fellows, emaciated, worn with fever and pain, swathed from head to foot in horribly foul-smelling bandages saturated with pus, disposing of these rations with a greed and avidity of poor starved beasts. The Austrians are good to their sick and treat them as well as they can, but the long, hard trips, the terrible wounds, and the enormous number of wounded make it impossible to prevent the state in which many of the patients arrive. Our chaplain was always on hand distributing cakes, cigarettes, and pipe tobacco, in a truly Samaritan fashion. Patients who could not help themselves were fed. We continually noticed that the men did not aid each other of their own accord; that a helpless patient was not fed until the attention of his comrades had been called to his predicament. Then, however, help would most willingly be given. In other words, the men seemed to disregard suffering, as, I feel sure, they never would have before their war experience. In the meantime the clerks, all of whom were polyglots, acquainted with at least half a dozen of the various languages in common use in Austria-Hungary, were filling out the headings of the history sheet, filing them with the previous records and identification cards which the soldiers bring with them. Each patient was given a bag in which he placed all of his clothing, shoes included. This bag was properly tagged, and kept for identification. The patients were allowed to keep their small personal belongings, a book or two, invariably a long pipe and letters with them. The undressed patient, wrapped in a sheet, was then carried into the connecting bath room. The barber met him and, with a few deft strokes, clipped his hair, beard, mustache and pubic and axillary hair. We had two kinds of bath tubs, the usual type and a very shallow kind. The latter were used for men with leg or body injuries. The injured members were supported on broomsticks to keep the bandages from being wet. There were two nurses to each bath tub, to give the soldiers a thorough scrubbing. We had fairly good green soap, we had stiff brushes, and the nurses had strong arms and good wills, and all dirt and much epithelium was removed. We could not force our Austrian nurses to wear rubber gloves and after several unsuccessful attempts we stopped trying. After the patient had been dried, his scalp, axillary and pubic region were vigorously rubbed with blue ointment. The soldier was then put on a hospital stretcher and taken into the adjoining surgical dress-

ing room, where, while waiting to be dressed, one of our clerks or a patient took a short history. We made it an absolute rule to remove every bandage immediately. No patient was allowed in the wards



Fig. 1.—The ambulance arrives.



Fig. 2.—Bathing the arrivals.

with any of the dressing which he had had on during the transport. We did this for many reasons. In the first place, the bandages often harboured fleas or lice. Then again we frequently found a

clean bandage covering up a dirty, filthy dressing, as likely as not fairly alive with maggots; this condition is not at all uncommon, nor does it necessarily show gross neglect. A suppurating wound, swathed in bandages which have not been changed in 48 hours, especially in hot weather and with the patient lying on the ground, or in the open box cars, will very easily be infested with maggots. Again we have discovered cases of erysipelas, or other infectious diseases, only after the removal of the bandages. It, of course, stands to reason that no diagnosis could be made with dressings on. The soldiers were often worn out and it was, time and again, a great temptation to waive all rules and put patients to bed. However, for reasons above mentioned, it seemed best to us to adhere strictly to the rules, except in very rare cases when a patient practically in shock would be put in isolation. There was one group of cases, however, which were regarded as exceptions, namely cases with simple fractures with apparently well fitting casts. These cases, especially where they brought with them the history that a simple fracture, having been reduced, had been placed in a cast, controlled by x-ray, were sent to a special ward; then left under special supervision until the next morning when they were x-rayed. Where the reduction was good, the casts were left in place, the patient kept, however, in the special ward for at least five days. In compound fractures arriving with fenestrated casts, we usually adhered to our rule of changing dressings, as not infrequently we found the condition of the wound, the first bandages, etc., to be very bad. Our procedure in dressing the cases was, as a rule, very simple. Wounds were rinsed with warm solutions, Dakin's, normal saline, permanganate, etc., and were either left open or simply covered with wet dressings. We avoided all operating and probing wherever possible. Only necessary examinations were made. A short description of the wound was dictated by the attending physician to the clerk who was writing the history. As a rule more complicated therapeutic measures such as extension devices, continuous irrigating outfits, etc., were postponed until the next day. The prime object was to clean the patient, see that there was no need for any immediate action, make him comfortable and insure a good night's rest. The soldier wrapped in a clean gown, well covered with blankets was then hurried to bed, where necessary bromides or morphine were given.

The last patient having been dressed, the physician of the day made hurried rounds, and the transport was a thing of the past.

DERMOID CYST OF THE OVARY COMPLICATING PREGNANCY.

By FRANK BENTON BLOCK, M. D., Philadelphia, Pa.

In reporting the following case, no idea is entertained of presenting an unusually rare complication of pregnancy, although of course, the combination of a dermoid cyst of the ovary and pregnancy is by no means common, but rather to add another case to the list of those already recorded and to show that the removal of such a tumor during pregnancy is perfectly compatible with a continued normal gestation, provided that certain fine points in judgment and technic are observed. A few years ago, Barrett (*Surgery, Gynecology and Obstetrics*, 1913, XVI, p. 28) presented an excellent review of the literature on this subject based upon 114 collected cases, as a result of which he strongly recommended the early removal of the ovarian tumor as the procedure of choice and just as strongly cautioned against inducing an abortion in any such case. Since this report of Barrett, there have been several case reports, a few of which shall be briefly mentioned. Salisbury (*Journal of Obstetrics and Gynecology of the British Empire*, 1916, XXVII, p. 197) reported three cases of ovarian cysts complicating pregnancy. In two of these cases the tumors were dermoids and operation was performed for removal of the cyst. In one of the cases a hysterotomy was performed and a living child obtained. In Humpstone's case (*American Journal of Obstetrics and Diseases of Women and Children*, 1916, LXXIV, 315), operation was not performed until the seventh month of pregnancy and then a hysterotomy had to be performed in order to give enough exposure to allow removal of the tumor, the child being lost. Doyle (*American Journal of Obstetrics and Diseases of Women and Children*, 1916, LXXIV, p. 849) managed to obtain a living child in his case, after operating during the fifth month of pregnancy; he kept the patient under the influence of morphine for five days after operation in order to lessen the uterine contractions.

A recent article by Lewis (*Surgery, Gynecology and Obstetrics*, 1916, XXIII, p. 663) presents some very interesting statistical facts about ovarian tumors complicating pregnancy. According to this author, such a complication occurs once in three thousand pregnancies. Of all the cases that have been reported 68 percent were cystadenomata, 23 percent embryomata (dermoids), 2 percent fibromata and 5 percent were malignant tumors. In 80 percent of all cases torsion of the cyst occurs; in about one-third of the cases

of complicating ovarian tumors more or less serious consequences ensue, while in about one-fifth of the cases, pregnancy is prematurely terminated. In view of the foregoing facts, it is readily understood why the consensus of opinion among the profession is that these tumors should be removed as soon as discovered, unless the pregnancy is well advanced and the tumor not obstructing the pelvic outlet.

CASE REPORT.

The patient, aged 24 years, consulted me in May, 1916, on account of dysmenorrhoea and dyspareunia. She had been married one year, had no children, no miscarriages and her menstrual history was negative. On examination at that time, the uterus was found retroverted and to the right of the uterus in Douglass' pouch was a tender mass about the size of a peach which was diagnosed as a prolapsed cystic ovary. In July she became pregnant and the knee-chest position was assumed daily in order to bring the uterus into anterior position. In September, the uterus became anterior and at the same time the patient noticed a tender swelling in the lower right abdomen. Vaginal examination at this time revealed that the mass which had been present in the right side of the pelvis, was no longer there, but could be felt higher and coincided with the mass in the abdomen. Aside from tenderness, there were no symptoms and as the mass was small and movable, a conservative plan of treatment was decided upon. The patient remained fairly comfortable until November, when she began having subjective pain in the lower right abdomen, increasing tenderness and some nausea. These symptoms did not subside and a few days later it was deemed advisable to remove the cyst, explaining to the family the possibility of a miscarriage following the operation.

On November 22, 1916, operation was performed and a dermoid cyst of the right ovary which had twisted once on its pedicle, was removed as gently as possible with especially careful precautions against indiscriminate manipulations of the uterus. The appendix was posterior and adherent rather high and was not removed as its removal would have necessitated undue intra-abdominal manipulation, which was to be avoided. After operation, the patient was kept constantly under the influence of morphine for over two days, but the nausea resulting from the use of the drug was so severe that it had to be discontinued, following which the convalescence was uneventful. She continued in her pregnancy without further trouble until March 26th, 1917, when she was delivered of an eight pound male baby by means of median forceps after a hard and dry labor. The puerperium was normal.

Cases such as this teach us to operate early and thus afford the best chances for a favorable outcome to both mother and child.

DIAGNOSTIC AND THERAPEUTIC NOTES.

PEPTONE INJECTION IN BRONCHIAL ASTHMA (*British Medical Journal*, May 5, 1917).—Auld reports the successful use of subcutaneous injections of Armour's peptone in the treatment of bronchial asthma. To begin with, 1/3 gram of peptone dissolved in about 5 c.cm. distilled water at blood heat is injected at intervals of three or four days during the first week. The next week two injections, each 2/3 gram, are similarly given, and in the third week two injections of 1 gram in 7 to 10 c.cm. water. In certain cases this may be sufficient; severer cases may require 1 gram weekly or bi-weekly for three weeks more. No apparent constitutional reaction follows, and, properly carried out, there should be little or no local reaction.

In the limited number of cases tried the results have surpassed expectation. In several cases of moderate asthma the symptoms have become perfectly quiescent, while others have greatly benefited. In one case three months have elapsed without any recurrence. Sometimes the effect is very rapid, the patient experiencing relief after one injection. Where attacks of great severity occurred every two or three months, a few weeks' treatment beforehand has caused the attack to abort.

HALAZONE FOR THE STERILIZATION OF WATER.—In the *British Medical Journal* of May 26, 1917, p. 682, Dr. H. D. Dakin and Major E. K. Dunham (U. S. Army) described the preparation of p-sulphondichloraminobenzoic acid and its value as a disinfectant for polluted water. They proposed the name "Halazone" for the substance and suggested that it should be put up in tablets, each containing 4 milligrams. This suggestion has now been carried out. The product is marketed in compressed tablets containing 4 milligrams of the disinfectant, the quantity stated by Dakin and Dunham to be sufficient to sterilize a liter or quart of reasonably heavily contaminated water; in the case of extreme contamination a second tablet may be necessary. The tablets dissolve gradually in about five or ten minutes, and the water should be allowed to stand for about forty minutes before use. The tablets must be kept in amber bottles and not exposed to sunlight; under those conditions they are stable. They are supplied to the medical profession in bottles of 100 at 8 d. (16 cents) each in the United Kingdom. In the United States the same quantity costs 25 cents, but a vial containing 1,000 tablets costs only \$1.

MISCELLANEOUS

MENTAL HYGIENE WAR WORK.

The Mental Hygiene War Work Committee of the National Committee for Mental Hygiene is anxious to obtain the names of psychiatrists and neurologists who are willing to give part-time service in the examination of National Guard troops in their vicinity. The recent decision of the War Department to examine the National Guard troops in their armories before sending them to camp, makes it necessary to secure at once a large number of examining physicians. To meet the situation the Surgeon General of the Army has arranged to accept for this work qualified physicians on contract. A physician may contract for specified duty, at a specified place, for a specified time, or for part-time. This latter provision makes it possible for many physicians who cannot take out commissions, or who cannot give all of their time to the work for a period of months, to give part-time each week. Further information can be received from Dr. Frankwood E. Williams, Vice-Chairman of the Committee, 50 Union Square, New York City.

Dr. Pearce Bailey of New York, Chairman of the Committee on Furnishing Hospital Units for Nervous and Mental Disorders to the United States Government, a sub-committee of the National Committee for Mental Hygiene, has been invited by the Surgeon General of the United States Army to accept a commission as major and to come to Washington as personal advisor to the Surgeon General in all matters pertaining to psychiatry and neurology; Major Bailey is now on duty in the Surgeon General's office. Dr. Frankwood E. Williams, Associate Medical Director of the National Committee for Mental Hygiene, has been appointed Vice-Chairman of the committee and placed in charge of the work in the New York office.

July 24, 1917.

THE NATIONAL BOARD OF EXAMINERS.

The National Board of Medical Examiners held its second examination in Washington, D. C., June 13 to 21. There were twenty-four qualified candidates, twelve of whom appeared for examination, the others having been ordered into active duty between the time of their application and the date of the examination. Of the twelve who took the examination nine passed.

The next examination will be held in Chicago, October 10 to 18. The regular Corps of the Army and Navy may be entered by successful candidates, without further professional examination, providing they meet the adaptability and physical requirements.

There will also be an examination in New York in the early part of December.

BOOK REVIEWS.

BLOOD-PRESSURE. From the Clinical Standpoint. By Francis Ashley Faught, M. D., Formerly Director of the Laboratory of Clinical Medicine and Instructor in Medicine at the Medico-Chirurgical College, Philadelphia. Second edition, thoroughly revised. Philadelphia: W. B. Saunders Company 1916. Price, \$3.25.

The second edition of Faught's "Blood-Pressure," like its predecessor, contains, besides a complete discussion of armamentarium and technic, a fairly adequate compilation of the current literature of the subject. It is throughout addressed to the general practitioner, who will find that it well serves his needs.

THE TREATMENT OF EMERGENCIES. By Hubley R. Owen, M. D., Surgeon to the Philadelphia General Hospital; Assistant Surgeon to the Philadelphia Orthopedic Hospital and Infirmary for Nervous Diseases; Chief Surgeon of the Philadelphia Police and Fire Bureaus; Assistant Surgeon Medical Reserve Corps, U. S. Navy. With 249 illustrations. Philadelphia: W. B. Saunders Company. 1917. Price, \$2.

This is an admirable little volume when considered from the viewpoint of its purpose. Dr. Owen specifically states that the book represents a basis of his lectures to policemen and firemen and to the nurses of hospitals. Any one finding himself obliged to deliver lectures on first aid to laymen or to nurses may rest assured that this handy treatise by Owen will serve him well as a reliable and satisfactory guide.

A MANUAL OF PHYSICAL DIAGNOSIS. By Austin Flint, M. D., LL. D., Late Professor of the Principles and Practice of Medicine and of Clinical Medicine in Bellevue Hospital Medical College, etc. Seventh edition, revised by Henry C. Thacher, M. S., M. D., Associate in Medicine in the College of Physicians and Surgeons of Columbia University, etc. Illustrated. Philadelphia and New York: Lea & Febiger. 1917. Price, \$2.50.

This edition of Flint's classic book on physical diagnosis comes at an opportune moment. The present-day student is in danger of neglecting the use of his unaided senses for the more spectacular "graphic methods" without apparently realizing that he may soon find himself in practice where the advantages of the x-ray and electrocardiograph are not always to be had. We should therefore welcome anew this work, which sets forth in such masterful manner the methods of auscultation and percussion. The editor of this edition has introduced a chapter on the physics of the subject, which should be particularly valuable to the student.

CATARACT—SENILE, TRAUMATIC AND CONGENITAL. By W. A. Fisher, M. D., Professor of Ophthalmology, Chicago Eye, Ear, Nose, and Throat College. Chicago: Chicago Eye, Ear, Nose, and Throat College. 1917.

This booklet of 119 pages is a brief in support of the intracapsular extraction of cataract, the so-called Smith-Indian operation. Dr. Fisher, by reason of his study of the operation under the direct tutelage of Colonel Smith, of Amritsar, India, is among the few Americans qualified to speak on this subject with authority. As is well known, Dr. Fisher has introduced certain modifications which are believed to render the operation safer in the hands of the operator who has not at his disposal the enormous material of an Indian Eye Clinic.

A new method of acquiring operative technic on the eye (by using the eyes of four-weeks-old kittens) is described. There seems to be no question that intracapsular extraction is gaining in favor in this country, and it behooves progressive ophthalmologists to render themselves familiar with the contents of this interesting booklet.

THE DIAGNOSIS AND TREATMENT OF ABNORMALITIES OF MYOCARDIAL FUNCTION. With Special Reference to the Use of Graphic Methods. By T. Stuart Hart, A. M., M. D., Assistant Professor of Clinical Medicine in the College of Physicians and Surgeons, Columbia University. Illustrated with 248 engravings, 240 of which are original. New York: The Rebman Company. 1917.

Since the work of Mackenzie with the polygraph, and later that of numerous workers with the electrocardiograph, our notions regarding the functional activity of the heart-muscle have been revolutionized. A new science has sprung into being, with a technic and a terminology unfamiliar to the general practitioner. Even though the latter may not be in a position personally to use these newer methods, a familiarity with their outcome is indispensable to a proper understanding of the significance of the data furnished by the ordinary methods of physical diagnosis. In this manual the reader will find the results of polygraphic and electrocardiographic work, and their significance to the practitioner, discussed clearly and simply.

A TREATISE ON DISEASES OF THE SKIN. For Advanced Students and Practitioners. By Henry W. Stelwagon, M. D., Ph. D., Professor of Dermatology in the Jefferson Medical College, etc. Eighth edition, revised. With 356 illustrations and 33 colored and halftone plates. Philadelphia and London: W. B. Saunders Company. 1916. Price: Cloth, \$6.50; half morocco, \$8.

The eighth edition of Stelwagon's Diseases of the Skin does not differ materially from its predecessors. This was to be expected, since the last few years have produced fewer and less important discoveries in dermatology than the immediately preceding periods. Nevertheless a number of the rarer diseases are adequately discussed for the first time, and some matter that had become obsolete has been omitted. The author's strong belief in the helpful value of illustrations is shown by the great number of plates, many of them colored and of a high degree of excellence. The plastic character of many of the illustrations is striking, and adds greatly to the value of a useful and thoroughly practical hand-book.

A MANUAL OF ORGANIC MATERIA MEDICA AND PHARMACOGNOSY. An Introduction to the Study of the Vegetable Kingdom and the Vegetable and Animal Drugs with syllabus of inorganic remedial agents), Comprising the Botanical and Physical Characteristics, Source, Constituents, Pharmacopoeial Preparations, Insects Injurious to Drugs, and Pharmacal Botany. By Lucius E. Sayre, B. S., Ph. M., Dean of the School of Pharmacy; Professor of Materia Medica in the University of Kansas, etc. Fourth edition revised. With 302 illustrations, the majority of which are from original drawings and photomicrographs. Philadelphia: P. Blakiston's Son & Co. 1917. Price, \$4.50.

The Ninth Revision of the United States Pharmacopeia, as in no previous edition, makes it important, and even necessary, that all works of a pharmaceutical character be revised. Among its conspicuous changes is the adoption of "mil" and "mils" for cubic centimeter. This coined word, mil for milliliter, is more accurate than cubic centimeter, expressing directly the thousandth of a liter. It omits 53 vegetable drugs and recognizes 4 others. These and other

changes are embodied in the new "Sayre." The arrangement of the botanical materia medica has been modernized and a chapter on serotherapy has been added. Thus brought up to date, the new edition is a convenient and satisfactory text-book.

DIAGNOSIS FROM OCULAR SYMPTOMS. By Mathias Lancton Foster, M. D., F. A. C. S. Member of the American Ophthalmological Society; Ophthalmic Surgeon to the New Rochelle Hospital, etc. New York: Rebman Company.

The author has attempted to analyze ocular symptoms, selecting certain ones for points of departure and arranging the others into syndromes, "showing how those which resemble each other differ and how exclusion is to be made." The symptom uppermost in the mind of the examiner serves as the starting point from which "to work outward toward the diagnosis," as the author expresses it. No attempt is made to "fill in all the details," as the author believes that only outstanding diagnostic points should be considered by the student. There is no discussion of treatment. As the author believes it impossible to present his points in a picture so as to make clear a differentiation between two conditions that closely resemble each other, he has purposely omitted illustrations.

The point of view is novel, and the method may prove to be practical and stimulating to the student.

THE PATHOLOGY OF NEPHRITIS. As illustrated by thirty-two consecutive cases. By William Ophüls, Professor of Pathology. From the Division of Pathology, Stanford University Medical Publications. University Press. 1916. Price, \$1.

The careful study of 32 cases of diffuse glomerulonephritis have led the author to some interesting conclusions. The disease may occur in acute, subacute, or chronic form. The first two are evidently due to bacterial infection, and this has been the general view for some time. The opinion is gaining ground, however, and is confirmed by the author's observations, that chronic nephritis is also due to a focal infection somewhere, often in the tonsils. The infectious agent is usually a member of the streptococcus family. It is probable that the continuance of the disease in the kidneys is due to the continuance of the infection in some often more or less hidden focus. In this connection it is of interest that H. N. Loeb has repeatedly seen chronic nephritis with hypertension clear up after tonsillectomy.

The author's observations also suggest the possibility that certain manifestations that accompany nephritis, such as edema, hypertension, and arteriosclerosis, are due not directly to the nephritis, but rather to the focal infection on which the nephritis itself depends.

COLLECTED PAPERS OF THE MAYO CLINIC, Rochester, Minn. Edited by Mrs. M. H. Mellish. Volume VIII. 1916. Philadelphia: W. B. Saunders Company. 1917. Price, \$6.50.

These "Collected Papers of the Mayo Clinic" are rapidly becoming an institution. One who correctly values the proper correlation of clinical and laboratory surgery hesitates even to qualify his admiration for the intensive efforts mirrored in this eighth volume. It is, of course, hopeless to attempt a detailed review of nearly a thousand pages of text made up of more than a hundred contributions by almost as many contributors, but, by way of stimulating others to read these contributions for himself, it may be said that the group of papers devoted to "Ductless Glands" must of necessity be read by anyone who even pretends an interest in this broad field. The papers of Edward

C. Kendall are, in many senses of the word, epochal. Practically the same may be said for the work of Rosenow. From the clinical point of view there is the usual strength and solidity that characterizes the work of the Mayos, Judd, Balfour, and the much lamented Beckman.

As in the past, the volume is divided into various parts, devoted to papers grouped under the heads of Alimentary Canal, Urogenital Organs, Ductless Glands, Blood, Head, Trunk, and Extremities, Technic, and General.

INTERNATIONAL CLINICS. A Quarterly of Illustrated Clinical Lectures and especially Prepared Original Articles. By leading members of the medical profession throughout the world. Edited by H. R. M. Landis, M. D., Philadelphia. Volume IV. Twenty-sixth Series, 1916. Philadelphia and London: J. B. Lippincott Company.

The present volume of the International Clinics is particularly valuable in containing several papers on much neglected, but most important, clinical subjects. Of particular interest is the review of the subject of Acute Syphilitic Meningitis by Bronstein. Contrary to a prevalent opinion, it would seem that the use of Salvarsan is not contraindicated in these involvements of the nervous system. It gives somewhat prompter, though on the whole not more satisfactory, results than the treatment with mercury. The paper of Bowers on the Psychology of the Criminal Under Sentence of Death is most timely in view of the discussion incident to the effort to abolish the death penalty in many of our states. The author seems unacquainted with Andreyf's book, "The Seven Who Were Hanged," which deals quite minutely with the same subject.

There is a profusely illustrated article by Blair on Cleft Palate and Harelip operations, which is doubly valuable in that it embodies almost entirely the personal experiences of the author, with important points in the operative technic.

THE TREATMENT OF INFANTILE PARALYSIS. By Robert W. Lovett, M. D., Boston, John B. and Buckminster Brown, Professor of Orthopedic Surgery, Harvard Medical School; Surgeon to the Children's Hospital, Boston; Surgeon-in-Chief to the Massachusetts Hospital School, Canton, etc. With 113 illustrations. Philadelphia: P. Blakiston's Son & Co.

The Treatment of Infantile Paralysis by Lovett is based largely upon the experience Lovett and his colleagues have had in various epidemics around Boston. Its value lies largely in the consideration of orthopedic measures which are here described very fully. The illustrations are of value as showing apparatus, plans of operation, and other procedures which are of use. As a consideration of anterior poliomyelitis from the purely medical point of view it has no particular value over other monographs on this subject. It is not complete and scarcely brings the little knowledge that we have up to date.

However, as a practical book on the treatment following the acute phase of the disease it has much to recommend it. The point of view of Lovett represents what may be considered at the present time the best possible therapeutic procedure. Lovett himself is a strong advocate of muscular rest, the favorable position of the joints affected in infantile paralysis. He is opposed to hasty operative measures, as well as exercise, electricity, etc., being begun too soon after the acute phase of the disease. In this opinion he is supported by those who have given the most thoughtful attention to the treatment of cases of infantile paralysis. At the present time in the face of the receding epidemic in the East, and the possibility of a new epidemic further West, this book is of particular value.

PRINCIPLES OF PHARMACY. By Henry V. Arny, Ph. G., Ph. D., F. C. S., Professor of Chemistry, College of Pharmacy of Columbia University; sometime Dean and Professor of Pharmacy in the Western Reserve University, etc. Second edition, revised. With 267 illustrations. Philadelphia: W. B. Saunders Company, 1917. Price, \$5.50.

The second edition of this valuable work has been thoroughly revised to bring the information contained into line with the revision of the pharmacopeia and with progress in pharmaceutical technic. The title of the work is misleading, for it deals not only with the principles of pharmacy, but practically covers the whole field, and it should be called rather "The Principles and Practice of Pharmacy." The book is written primarily for pharmacists, but much of it, particularly the chapter dealing with the prescription, might profitably be read by physicians. Though the language is at times inelegant, the work is eminently readable, largely because the author does not hesitate to bring in apparently irrelevant information when it seems to him that the subject will thereby be lightened and rendered less dry. A few odd mistakes have crept in, as, for example, when sodium thiosulphate is described as a photographic "developer." Such chemical information as is contained should be regarded as revision, preliminary to the reading of the pharmaceutical matter. If any fault can be found, it is that the author has been tempted to go too far into theoretical chemistry. On the pharmaceutical side this work is sound, thorough, and interesting.

HARVEY'S VIEWS ON THE USE OF THE CIRCULATION OF THE BLOOD. By John G. Curtis, M. D., LL. D., Formerly Professor of Physiology in Columbia University in the City of New York. Based on a lecture delivered in 1907 before the Johns Hopkins Hospital Historical Club at Baltimore. New York: Columbia University Press. 1915. Price, \$1.50.

In 1907 Prof. Curtis, of Columbia University, delivered a lecture on Harvey before the Johns Hopkins Hospital Historical Club, a lecture so scholarly and thoughtful that, at the urgent request of his friends, he expanded it into the volume under consideration. Prof. Curtis was not only a physiologist of note, but a classical scholar of unusual attainments. This combination of qualities is essential in one who aspires to produce a critical estimate of Harvey's work, for not only are all of the formal writings of Harvey in Latin, but those of his letters that have a scientific content are in the same tongue. Prof. Curtis died before his manuscript was ready for the press, and the necessary editorial work was entrusted to Dr. Lee, who with rare modesty has refused to permit his name to appear on the title page.

The book is not easy reading, but this is not because of any defect in the style, but on account of the knotty nature of the subject itself. The reader who has the persistence to work his way through the not very long book will, however, be well repaid by a vivid notion not only of Harvey's work, but by a clearer picture of his intellectual environment. Although Harvey had the courage and the originality to break away from the bonds of authority, he was still a child of his age and differed from his colleagues most strikingly in that he went back for his inspiration to Aristotle instead of merely to Galen.

THE INTERNAL SECRETIONS—THEIR PHYSIOLOGY AND APPLICATION TO PATHOLOGY. By E. Gley, M. D., Professor of Physiology in the College of France. Translated from the French and edited by Maurice Fishberg, M. D., Clinical Professor of Medicine New York University and Bellevue Hospital. New York: Paul B. Hoeber. 1917. Price, \$2.

This book deals with the concepts, characteristics, and functions of the internal secretory glands. After reviewing past and current theories relative to the endocrine glands, the author projects his own views in a systematic manner and by means of two charts.

Gley contends that the essential proof of an internal secretion is the demonstration of a specific glandular product in the venous blood returned from the gland. The doctrine of internal secretion based on pharmacodynamic studies of organ extracts is held up for special criticism—extracts of organs are conglomerates, and results obtained by the use of them cannot be attributed directly to their possession of an internal secretion.

Certain pathological syndromes commonly attributed to defective functioning of the endocrine organs, according to Gley, may be more or less due to disorders of metabolism of the organ itself, and not entirely to changes in the amount of the formed hormone. The theories concerning reciprocal action among internal secretory glands are severely criticised, and one wonders what to believe.

The work does not presume to offer new data. It is, throughout, a critical examination and analysis of the theories of internal secretions and an estimation of the values of organotherapy. The criticisms, as a whole, are well taken, but one continually feels an overactive conservatism in respect to many of the subjects discussed.

As a conservative, critical treatise the book forms a needed chapter in the maze of modern works and theories concerning the endosecretory organs.

H. W.

THE BIOLOGY OF TWINS. By H. H. Newman, Ph. D., Professor of Zoology, University of Chicago. University of Chicago Press, 1917. 186 pages.

In this book, as indicated in the preface, a considerable mass of data dealing with the phenomena of twins in man and other mammals is for the first time presented in a single volume.

The first chapter is given to a brief discussion of the various kinds of human twins. This is followed by a resume of the results of investigations carried on by the author and his coworkers on the embryology of the armadillo (*Dasypus novemcinctus*). The data presented establishes the fact that in this species all the young in a litter (usually four) arise from a single fertilized egg. Separation of the primary blastomeres does not occur, but, after gastrulation is completed and inversion of the germ layers accomplished, four embryonic primordia arise in the single ectodermic vesicle. While bastotomy does not occur, there is, in the opinion of the author, "much evidence that the cell descendants of each blastomere of the four-cell stage constitute essentially a quadrant of the vesicle and that therefore the inherited characters of each embryo are dependent on the particular quadrant, or parts of different quadrants, from which it is derived."

The data available on multiple human births is interpreted in the light of the facts revealed by the investigations referred to above, and the conclusion is drawn that monozygotic human twins arise, not from blastomeres which become separated from each other in the two-cell stage, but from two embryonic primordia which become differentiated in the same ectodermic vesicle. The same conclusion is drawn regarding monozygotic twins in ruminants.

In the final chapters the bearing of twins on the problem of sex determination is considered. Evidence is presented also which indicates that monozygotic twins, though always of the same sex, may show a marked degree of variation. It is suggested that dissimilarity in twins does not disprove their monozygotic character, and that monozygotic human twins probably occur more frequently than is indicated by data based on similarity and dissimilarity.

The author has done a distinct service in bringing together and correlating so much data bearing on the biology of twins. He has avowedly made an attempt to write in a manner acceptable both to professional biologists and to the public. While he has not materially sacrificed scientific adequacy, the lay reader will probably find this volume somewhat too technical to fascinate his interest.

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EDITORIAL.

MEDICAL PRACTICE AND LICENSURE.

The delegation of police power is an action always jealously watched, and rightly so. When that delegation results in the regulative functions of the state passing into the hands of the very class of persons sought to be regulated, a condition arises which, when it is realized, invariably becomes a storm center.

When, further, the law to be administered by the body to whom the police power is delegated has a commercial aspect and is calculated to work in favor of one class solely or preponderatingly represented on that body as against other professional competitors, then no evidence of good faith, however cogent, will prevent the formation of a public opinion adverse to the law, to the body administering it, and, eventually, to the school of thought predominating in the constitution of that body.

Such, stated in general terms, is the position today in many of the states of the Union as to the exercise of police power in the matter of licensure to practice medicine.

In this respect the State of Ohio presents an example at once typical and of urgent interest. In the first place the law in that state is substantially what has just been described. Secondly, there is considerable legislative movement in connection with these matters, and thirdly, there is a tendency to fair treatment of the question and to an avoidance of freak legislation.

The address of Senator Howell Wright, Secretary of the Cleveland Hospital Council, delivered before the Ohio State Medical Association in May of this year, contains a succinct statement of the present position and of the problems towards which it is necessary for the medical profession to turn a watchful eye, if it would maintain that position of leadership which its history, traditions, achievements, and higher standards entitle it to claim.

I make no apology for using substantially the phraseology of Senator Wright in what follows. No layman has ever been in a better position to understand the real questions at issue, and it is to such men as Mr. Wright, standing as he does as the interpreter of the medical profession's true aims to the public and of legislative possibilities and dangers to the medical profession, that we must look for counsel as to our own attitude.

The Medical Practice Act, through which Ohio regulates medical practice and license, is a "bone of contention" in every Legislature. As a rule it is actively upheld by every State Medical Board and the State Medical Association, chiefly on the ground that the lowering of educational standards is inconsistent with the best interests of the public. It is opposed by drugless healers and other limited practitioners who seek amendments granting limited or equal privileges. Some seek to "get in" under the Act, while others seek to "get out from under" control of the Medical Board.

Interested forces combine with one another and seek and sometimes secure the assistance of political parties regardless of party affiliations. The medical profession has been forced to organize and play its part in legislative activity.

There is a general feeling that the Medical Practice Act is out of date. It does not represent the schools of practice of the state as is required—namely, in proportion to their numerical strength. If this is the modern basis for representation on such an important State Board, then the present arrangement is "mis-representation" which, of course, is wrong. It is fundamentally wrong, because it "smells of sectarian medicine."

This feeling became more intensified in the last session through the introduction of bills authorizing special boards to regulate different schools of practice. Naturopaths, Chiropractors, Optometrists and others, each asked for separate special boards. If the state allows the medical profession to regulate itself, why should it deny the same privileges to these schools of practice?

The Legislature has had difficulty in distinguishing between the State Medical Board and the State Medical Association. The two have become synonymous in the minds of many of the members. This is partially responsible for the claim that the police power of the state has been placed in the hands of the medical profession to regulate the practice of medicine in the interests of that profession. Other "schools of practice" have not been slow to agitate along this line. They have played it skillfully and followed it up with the claim that the medical profession fears their "competition" and that the Medical Board regulates accordingly.

The Legislature as well as the public is now fully aware of certain commercial aspects of the Medical Practice Act. So is the medical profession in general. Members of the Legislature now under-

stand that the legal, fundamental basis of medical practice is commercial. It is generally understood that the State Medical Board cannot prove the practice of medicine unless it proves the giving of a fee.

In the Senator's judgment the medical profession has been much misunderstood. Under the present system, however, this misunderstanding and the reasons for it will continue. The profession has through now out of date laws been compelled to regulate itself. It has been compelled to plead for its interests as being the best interests of the public. It has had to defend itself in the Legislature. It has had too "boost" itself.

Unfortunately, selfish motives have been attributed to unselfish activities and devotion to the cause of medical education. What procedure and action is necessary to correct these impressions, some of which are entirely erroneous, this legislative state of mind; and to convince the public that "the best interests of the medical profession are consistent with the best interests of the sick public?" There can be no doubt that this is a problem to be met and solved.

The legal, commercial basis of medical license and medical practice is entirely wrong, as are all of the commercial aspects of the present Medical Practice Act. It is of doubtful protection to the public. Why should the State Medical Board, sometimes with the assistance of the Attorney General's office or others, spend its time trying to ferret out legal proof that John Smith received a fee or some other direct or indirect compensation for administering a drug, thereby violating the Medical Practice Act? Should not the chief concern of the State be, did John Smith have the educational qualifications and the necessary training to insure the fullest measure of protection to his patient?

Education should be the only basis of medical license and practice. The fee section of the Medical Practice Act should be dispensed with. Let no one be allowed to practice "limited" or "unlimited" unless he can meet certain educational qualifications. The medical profession should not have to worry about the requirements of others. It should not have to fight each year in the Legislature. If it renders effective service, the public will demand that service.

Ohio is ready to consider the general education board plan. The members of such a board should be educational authorities. No profession to be regulated by the board should be represented on it. The assistance of experts would be required in technical and professional matters. It might be delegated general authority to fix certain educational qualifications and requirements for certain professions. A new plan of regulation of medical licensure and practice, "limited" and "unlimited," might be very properly one of its first duties.

This is, in fact, the plan followed by the majority of Continental

legislatures in dealing with license to practice any profession, not only medicine. Such power is exercised by a Ministry of Public Instruction, advised in technical matters by competent counsellors. As in those countries only what we call regular practitioners are recognized, the problem is not identical with ours. The principle, however, is probably sound.

The title of "physician and surgeon" has been earned by our school of professional practice, and we have the right to it. It is probably useless for us to ask that those who do not go through as rigorous a course as ourselves should be debarred from pretending to treat disease, but we have, I think, the right to insist that those who are not "physicians and surgeons" shall not use a title expressing or implying that they are such, and that those who do not hold a doctorate of a recognized university shall not call themselves "doctors." Indeed, if we show ourselves reasonable and businesslike on other points, it should not be impossible to persuade the more enlightened legislatures to ordain that every practitioner shall, in every public notice, advertisement, name plate, or wherever the nature of his profession should be indicated, use a title showing truly what is the character of his business.

The business is such that the medical profession should take warning. The medical practice laws in their present form are doomed. Radical changes have been proposed. The public is about to take a hand. It presents, however, a golden opportunity for the profession to co-operate.

The medical profession has long been in a position of leadership. It can maintain this position as long as it desires. Inaction on its part will result in its being led about unwillingly. Action in the shape of co-operation will give the profession an opportunity to hold a position of leadership.

COLLECTIVE ABSTRACTS

ANTISEPTICS AND GERMICIDES—A REVIEW OF SOME RECENT WORK.

BY THE EDITOR.

It is not intended to deal exhaustively with the recent literature on antiseptics and germicides, even in abstract form. To do so for the hypochlorites and their congeners alone would take up a whole issue of the INTERSTATE. Nor will the therapeutic aspects of the question be touched on except incidentally.

Specific Action of Antiseptics, or when is an Antiseptic not an Antiseptic?—Although, for want of a better criterion, it has been the convention to estimate the antiseptic and germicidal value of substances by comparing their action, under critical conditions, with that of some one standard product upon a given organism, there has been a lingering suspicion that this method does not give results capable of being interpreted, in terms of practical application, to all the purposes for which disinfectants and antiseptics are used.

No doubt a part of the discrepancies is attributable to the radical differences between the conditions of practical application and those of laboratory tests. Some of these differences it is difficult to allow for in making comparisons, and this is particularly the case with those introduced by the presence of pus, fibrin, or necrosed tissue in the wound.

Taylor, director of laboratories of the Robert Walton Goelet Research Fund, in a suggestive article on Specificity in Antiseptics lays emphasis on the probability that the difficulty encountered in applying the results of laboratory tests more particularly to surgical work is, in part, due to the fact that different substances, of the same phenol coefficient, have widely varying actions on the same pathogenic organisms. In other words, that there exists a *specific sensitiveness of a given microorganism to certain reagents*. In speaking of antiseptics as applied in surgery, he uses the term "dressing solution" as being noncommittal. Such a solution may belong to one or more of four classes:

1. It may be bland.
2. It may be a coagulant of protein.
3. It may be a solvent of protein.
4. It may have a toxic action on protein independently of any coagulant or solvent action.

Experimental Evidence.—In an investigation destined to probe the question of specificity it is evident that substances of the fourth class are the most promising to use. Taylor reports experimental work conducted on four chosen organisms with two classes of substances: The organisms chosen were the *Streptococcus pyogenes*, *Staphylococcus aureus*, *Bacillus pyocyaneus*, and the *Bacillus aerogenes capsulatus* (the microbe of gas gangrene).

The first class consists of certain acids, particularly organic acids, such as occur in byproducts of bacterial action and whose development in the medium produces autoinhibition. The second series of experiments was made with a few of the commoner antiseptics.

In the technic care was taken to eliminate as far as possible the usual causes of error, which Taylor states to be incomplete admixture of the culture

with the substance being tested, variations in the degree of infection, variation in the aeration of the mixture, and variation in the age, the strain, and the vegetative activity of the culture employed.

Table I shows the approximate concentration of the acids in the mixture necessary to inhibit growth.

TABLE I.

Acid	Streptococcus	Staphylococcus	B. pyocyaneus	Gas bacillus
Hydrochloric. . . . .	.21	.22	.22	.11
Nitric. . . . .	.16	.23	.22	.11
Acetic. . . . .	.31	.29	.08	.11
Butyric. . . . .	.15	.24	.13	.11
Propionic. . . . .	.11	.12	.08	.19
Tartonic. . . . .	.29	.16	.42	.07
Malic. . . . .	.21	.16	.12	.04
Tannic. . . . .	.19	.29	.50	.50

It will be noted that the two mineral acids require the same concentration to inhibit the growth of the organisms, but that about half the concentration necessary to inhibit the other three organisms suffices to prevent the growth of the gas gangrene bacillus. The table brings out the high specific sensitiveness of *B. pyocyaneus* to acetic acid, an experimental result anticipated by clinical experience. Propionic acid has an equally strong action against the *B. pyocyaneus*, but its action is less specific than that of its lower homologue, in that it has also a high inhibitory action on all of the organisms tested. Tartaric acid has a marked selective action against the gas bacillus, less against the staphylococcus, while it is practically inert against the streptococcus and the *B. pyocyaneus*. Malic acid shows the highest specific inhibitory action on the gas bacillus, against which, as well as against the *B. pyocyaneus*, tannic acid exerts no action and but little against the streptococcus.

Table II deals with similar tests made with the commoner antiseptic products:

TABLE II.

Antiseptic	Streptococcus	Staphylococcus	B. pyocyaneus	Gas gangrene bacillus
Phenol. . . . .	.07	.26	.10	.65 to 2.00
Cresol. . . . .	.06	.09	.06	.26
Thymol. . . . .	.08	.16	.5x	.26
Dakin's solution.	3.42	17.6	34.34	28.62 to .50
Quinine hydrochloride. . . . .	.15	.41	.77	.07 to .19
Ammonium fluoride. . . . .	.30	.24	.24	.35
Sodium fluoride. . . . .	.17	.08	.17	.30
Salicylic acid. . . . .	.47	.28	.47	.08
Sodium chloride.	5.51	14.28	14.6	4.0

On inspecting this table, one is struck immediately by the difference between the action of phenol and cresol. The most important fact demonstrated is, however, the absence of inhibitory action of Dakin's fluid on the *B. pyocyaneus* and on the gas gangrene bacillus, which is in line with clinical observations. Quinine hydrochloride, which is clinically known to have a powerful action on the gas gangrene bacillus, is found to exhibit the same phenomenon *in vitro*, while it is inert against the *B. pyocyaneus*, has but little action on the staphylococcus, and has a moderately inhibitory action against the streptococcus. Salicylic acid, strongly inhibitory to the gas bacillus, is practically inert against the others.

Clinical Evidence.—Taylor has extended his work to actual surgical experience in connection with chronic infections of wounds. The first part of the investigation consisted of a continuous census of the organisms found in a large series of cases during five weeks of observation. The results are tabulated

in percentages of the cases giving positive cultures of five classes of organisms—namely, streptococci, staphylococci, *B. pyocyaneus*, *B. proteus*, and diphtheroids. These results were compared with those obtained with 165 cases, divided into nearly equal groups and treated for five weeks with certain dressing solutions: Dakin's fluid; quinine hydrochloride, 5 percent; isotonic saline; hypertonic saline; hypotonic saline; acetic acid, 1 percent; sodium bicarbonate, 1 percent; cresol, 1 percent; benzoic acid, .5 percent. The last four were made up in isotonic saline.

The percentage incidence of streptococci was unaffected, except for a slight decrease under sodium bicarbonate. *B. pyocyaneus* increased under Dakin's fluid, quinine hydrochloride, and sodium bicarbonate, and decreased very much under the acetic acid solution. Quinine hydrochloride exerted a marked specific effect on the bacillus of gas gangrene.

Taylor's conclusion is that, at any rate in cases of chronic infection, it will be necessary to choose a dressing solution specifically directed against the organisms causing the infection, and that it may be necessary to eliminate one organism after the other by the successive use of appropriate antiseptics.

A second conclusion, which seems equally obvious, is that the results of no one method of examination can give us a satisfactory idea of the practical value of an antiseptic or germicide.

Diffusibility, Chemiotactic, and Antiferment Action of Antiseptics.—Magee has examined a number of the commoner antiseptics and dressing solutions, to use Taylor's noncommittal expression, with a view to testing their respective actions on ferment activity and on phagocytosis, and their diffusibility.

It is somewhat surprising to find this worker laying down that one of the principal desiderata in the treatment of a wound is the prevention of all ferment action. (I am relying on an abstract published in the *Journal of the American Medical Association*.) This is in flat contradiction with the views of most recent writers, and especially with those of Wright. It is generally held that the tryptic action which follows on the breaking up of leukocytes plays a defensive rôle. The hypochlorites are commended because they do not inhibit this digestive action.

Of the antiseptics examined, Magee finds chinolol the most and iodine the least diffusible. Thymol and potassium iodide are positively chemiotactic—i. e., they "attract" leukocytes, and therefore should promote phagocytosis. Dakin's fluid and phenol, on the other hand, are decidedly negatively chemiotactic—they repel leukocytes. Quinine exhibits this property in a less degree, while chinolol and physiological saline solution are indifferent. Quinine and chinolol are true antiferments, according to Magee.

Resistance of Tissues and of Bacteria to Antiseptics.—Lambert seeks to establish a comparison between the resistance of human tissue cells to antiseptics and that shown by bacteria. In his technic he avails himself of the methods developed for the growth of tissues *in vitro*, employing for test objects and for controls portions of human tissues removed during operations or soon after death. These he divides into small pieces of about 5 mm. The excess of blood and tissue fluids having been washed away with isotonic saline, the test pieces are soaked in a broth culture of *Staphylococcus aureus*. They are then placed for one hour in the antiseptic solution to be tested, washed once more with isotonic saline, and, finally, "planted" in a culture medium composed of chicken plasma and human serum in the proportion of 1 to 4. Controls are, of course, employed. About 2,000 of these cultures were made. Of all the antiseptics tested, iodine was the only one which was parasitotropic—i. e., it was the only one which was bactericidal in concentrations too weak to inhibit the growth of the tissue cells.

Under the conditions of these experiments, iodine in a concentration of

1/2,000 killed the staphylococcus, while a concentration of 1/1,250 was necessary to inhibit the growth of the tissue cells.

The results are especially interesting in view of the recent introduction of dyestuff germicides, presently to be described, for which it is claimed that they are powerfully bactericidal in concentrations which are entirely innocuous to human tissues.

It is characteristic of the confusion in which the whole subject is involved, and of the discrepancies which result from variation in methods, that Lambert finds that staphylococci in tissues are killed by iodine in a concentration of 1/2,000, while Emery estimates the bactericidal concentration of the same antiseptic, tested against *Streptococcus fecalis*, to be in the neighborhood of 1/60. Yet each author is drawing his conclusions from the results of a technic especially calculated to imitate wound conditions and to furnish data applicable in wound therapy.

Lambert considers as a serious drawback the solvent action of iodine solutions on fibrin, a property shared by the hypochlorites. Yet we find Fiessinger, Talbouriech, and Moiroud, at a meeting of French army surgeons, dealing with the noxious rôle of pus leukocytes in wounds and commending the hypochlorites for their solvent action.

Standardization of Antiseptics.—Walker, pleading *pro domo suo*, makes a strong case for the standard Rideal-Walker method of determining the phenol coefficient as against the innovation and alleged improvement on that procedure generally known as the Hygienic Laboratory method, because it was first published in the Hygienic Laboratory Bulletin No. 82. The principal points of attack are:

1. The H-L method makes inadequate provision for insuring the purity of the phenol used. The authors content themselves with calling for Merck's Silver Label phenol. According to Walker this introduces an important source of error, in that variable quantities of cresol vitiate the result. He points out that the alternative of submitting the phenol to fractional distillation and using the middle fraction, so far from improving matters, actually yields a product with more cresol. Walker insists on a phenol of purity controlled by the melting point, which should be about 40° C., though any phenol of higher melting point is acceptable.

2. The culture is weak, owing to the nature of the medium, and significant variations are thereby introduced.

3. In the Rideal-Walker method the strength of the antiseptic is varied, while the time remains invariable; the phenol coefficient is calculated from the dilution which does not kill in five minutes and does kill in seven and one-half minutes. In the H-L method a combination of the time variation and the dilution variation is employed. Walker states that this leads to inconstant results and to a nonsignificant figure, the ratio being one made between unrelated quantities. The argument reminds one of the statistician who, finding that half the inhabitants of a certain town were males and half females, concluded that the average inhabitant was a hermaphrodite.

Walker asserts that this element of inconstancy and nonsignificance in the H-L method has already been seized on and exploited by unscrupulous manufacturers.

4. The multiplicity and complexity of operations to be performed in a limited time, under the H-L technic, results in slovenly work and want of precision.

5. The use of open containers in the H-L method, following the *Lancet Commission* procedure, leads to contamination, as evidenced by the inconsistency of the figures given by Anderson and McClintic themselves, "growth" and "no growth" signs overlapping and interchanging. Walker clinches his argument by adducing a concrete case in which a number of experts, using the H-L method, returned widely varying figures for the phenol coefficient of the same antiseptic, while others, using the Rideal-Walker technic, found all the same coefficient. The names of the members of the two groups of examiners are given.

Our next author, Emery, would doubtless characterize the discussion that I have just summarized as academic, if not futile, for he affirms that "the carboic acid coefficient may have a commercial value, but it has no other."

Emery propounds a special technic for the purpose of ascertaining the value of an antiseptic in wound therapy. He precedes the description of the procedure recommended by a discussion of which the following is a summary. It is necessary to produce as nearly as possible the conditions met with by the bacterium and by the antiseptic in a wound. The first essential is to employ a mixing fluid comparable with those present under such conditions. Serum he rejects, saying, "I know of no condition which occurs in surgical practice in which the problem is to sterilize blood serum." Pus is too variable in chemical, histologic, and biologic characters. Blood is fairly constant and is the fluid with which one has to deal in the early stages of wounds. But coagulable blood is, obviously, not utilizable. Defibrinated blood is too much denatured. Citrate blood cannot be employed with substances containing calcium salts.

Remains "reconstituted" blood. To the plasma of defibrinated blood is added an equivalent quantity of the washed corpuscles of citrated blood.

Emery elects the *Streptococcus fecalis* as the test organism, because it is of medium resistance and because it is one of the commonest, if not the commonest, of those encountered in the practical application of the data we are seeking. It is also easy to emulsify, an important technical advantage.

The manufacturer of a new germicide would doubtless prefer the more delicate *B. typhosus*, while the opponents of antiseptic methods would put forward the robust *B. subtilis* as their champion.

By the use of heavy inoculations, Emery seeks to avoid the error of the small sample. Specifically, 9 parts of reconstituted blood are mixed with 1 part of an 18-hour culture containing about 250,000,000 streptococci per c.c.

Many germicides are fixed by the blood contents. In some cases this immediate "quenching" effect is followed by a slow dissociation. The result is that a continual decrease in the number of organisms found alive is noted. In other cases the antiseptic action is exerted only on the first contact, and, after the lapse of time, the bacteria not killed will pullulate in the medium. Phenol belongs to the first, ensol and Dakin's fluid to the second group. Emery therefore considers that the concentrations of the germicide capable of killing in a short and in a prolonged exposure should be known.

Emery attaches no weight to the recommendation, usually made, to sow the treated organisms in a large volume of broth in order to remove any adherent germicide. He holds that this is based on an erroneous idea of the diffusibility of germicides in an agar medium. By comparative tests he has satisfied himself that there is no appreciable difference between the results obtained by subcultivating in broth and those given by plating on a deep agar medium. The agar medium has the advantage that it permits of plating out and

counting the colonies, thus yielding a quantitative result. Table III exhibits Emery's results.

TABLE III.

Antiseptic	15 minutes' exposure		60 minutes' exposure	
	Concentration fails to kill	Concentration kills	Concentration fails to kill	Concentration kills
Phenol.	1-70	1-60	1-60	1-50
Ensol.	undiluted	—	undiluted	—
Dakin.	undiluted	—	undiluted	—
Sublimate.	1-100	1-80	1-100	1-80
Binioidide.	1-60	1-40	1-60	1-40
Iodine.	1-100	?	1-100	?
Lysol.	1-40	1-30	1-150	1-120
Malachite gr.	1-250	1-200	1-250	1-200

The curious inconsistency in the phenol figures is not explained. In view of what Emery says about phenol belonging to the progressive action type of germicide, and of his silence on the subject of this discrepancy, one is tempted to suspect a transposition of the figures for 15 minutes and those for 60 minutes.

With regard to iodine, Emery remarks that the chemical action in concentrations above 1-100 converts the mixture into a tarry mess. He estimates the germicidal concentration at about 1-60. I have already contrasted this with Lambert's figure of 1-2,000.

From all that precedes, one may conclude that we are on the threshold of a new era of thought in connection with antiseptics and germicides. Hitherto we have been content to think that "antiseptics are antiseptics" just as "eggs is eggs." We are now called on to enlarge our categories, for we are face to face with a problem analogous to that dealt with by *Punch's* freight agent, in the early days of railroads and of freight rates. "Cats is dogs," said he, "and rabbits is dogs, but tortoises is hinsecks and, as such, goes free."

New Products.—Schomberg and his collaborators describe a new cyclic compound containing mercury, which possesses remarkable germicidal properties. This is sodium oxymercury orthonitrophenolate. The position of the mercury in the structural formula has not been definitely determined. The following are some of the properties of this new product, to which the name "mercurophen" has been provisionally given.

1. Against the staphylococcus mercurophen exerts an antiseptic power 50 times greater than that of mercury bichloride, and, on prolonged exposure in bouillon emulsion, is germicidal in a dilution of 1/10,000,000.

2. Against the same organism suspended in ascitic fluid, mercurophen is 200 times more active than the bichloride.

3. The phenol coefficient determined by the Rideal-Walker method is 10,000, more than 30 times that attributed to the bichloride.

4. Dilutions of 1/10,000 to 1/40,000 will sterilize the hands (of laboratory workers) in one minute. To produce this result, a 1/5,000 dilution of the bichloride takes five minutes; a 1/10,000 dilution, 15 minutes.

5. Ordinary rubber tubing is sterilized by exposure during thirty minutes to a dilution of 1/100,000; the bichloride solution would need be 1/16,000. Purposely massively infected rubber tubing requires 1/500; 1/50 bichloride failed to effect sterilization.

6. Mercurophen well mixed with feces in the proportion of 1/5,000 sterilizes them in thirty minutes. A concentration of the bichloride of 1/2,000 would be required to effect this.

7. The precipitating effect on albuminous substances is four or five times less than that of the bichloride.

8. A 1/5,000 solution does not tarnish bright instruments.

9. When intravenously injected into rabbits, mercurophen is less toxic than the bichloride.

In reviewing Lambert's work we have seen that practically all common antiseptics are organotropic. So those who look to the encouragement of the modern version of the *vis medicatrix naturæ* for wound therapy, these antiseptics are anathema. And small wonder, for they are highly toxic to the cell, they nullify the bactericidal power of the serum, most of them inhibit phagocytosis, many unite with the proteins and leave a favorable culture medium for bacteria. It will be interesting to watch the attitude of the physiologic defense school toward the substances now to be described.

Browning and his colleagues, in reports to the Medical Research Committee, dealing with the antiseptic and germicidal value of certain dyestuffs, propose a "therapeutic coefficient" for antiseptics. This they would make the ratio between the highest concentration which does not reduce phagocytosis below 50 percent and the weakest concentration which kills staphylococci in serum.

These reports deal in great detail with the properties of Brilliant Green, of Flavine, and of Proflavine.

Brilliant Green is a familiar dyestuff of the diaminotriphenylmethane series. Flavine is diaminomethylacridine chloride. Proflavine is produced in an early stage of the manufacture of flavine and is unsubstituted 3.6.diaminoacridine sulphate.

Flavine was first made by Benda for Ehrlich, and on account of its action on trypanosomes was named tryproflavine.

Brilliant Green, though possessing remarkable antiseptic and germicidal properties, and though it is superior to its close relative malachite green in respect of nontoxicity and noninhibition of phagocytosis, is eclipsed in all respects by the two acridine compounds.

The outstanding peculiarity of flavine and proflavine is that *their germicidal power is much enhanced by the presence of serum*, and when so admixed they are the most potent of all known bactericides against staphylococci and the colon group, and are equally effective against the enterococcus and anaerobes. They exhibit a progressive action in a marked degree, so that concentrations too weak to kill quickly, first inhibit the growth (a true antiseptic) and then kill the organisms. Such concentrations and even stronger ones have no harmful effect on tissues or on phagocytosis and *may, with safety, be applied to the peritoneum*.

Owing to the low toxicity of these compounds, they may be repeatedly applied as in Carrel's technic for Dakin's fluid, but, as their action is so progressive, the appropriate method is to use gauze soaked in a solution. Clinical results have amply confirmed the anticipations formed of the therapeutic value of these substances, both for preventing and inhibiting infection and for sterilizing wounds.

Doubtless the fact, mentioned in an earlier part of this paper, that the hypochlorites are not of the progressive action type, coupled with the complication of the Carrel irrigation technic, is the inspiration of the three papers on chloramine-T paste, published in the *Journal of Experimental Medicine* for July, 1917. Chloramine-T paste is composed of neutral sodium stearate, 86 grams; chloramine-T (Dakin's toluene sodium parasulphochloramide), 4 to 10 grams; distilled water, 1,000 c.c.

Vincent, from a consideration of twenty infected wounds treated with this paste, seven of which were sterilized, argues that complete sterilization of wounds is attainable. He points out that less than this justifies suture. Daufresne finds that the paste is sufficiently stable to be used for the treatment of wounds. Carrel and Hartmann conclude that, while slightly infected wounds

may be sterilized with the paste, it is useless to attempt to sterilize a heavily infected wound therewith. They find that the paste does not modify unfavorably the curve of cicatrization.

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THE DIAGNOSIS OF PITUITARY DISORDERS.

By CLIFFORD B. WALKER, A. M., M. D., of the Editorial Staff.

There may be dyspituitarism with or without tumor of the pituitary body. The diagnosis of tumor of the pituitary body often rests on the demonstration of: (1) symptoms of glandular disturbance or dyspituitarism, (2) enlargement of the sella turcica as shown by x-ray, (3) characteristic defects in the fields of vision.

The symptoms of glandular disturbance as a whole may be considered as resulting from disturbed secretion of one or both parts of the gland. Thus, the anterior portion, which is strictly epithelial in origin and discharges its secretion into the large sinusoidal blood channels which traverse it, is chiefly related to factors of skeletal development, and may be considered to elaborate a hormone capable of stimulating growth. The posterior lobe, on the other hand, is neuroepithelial in origin and may also secrete into the cerebrospinal fluid directly. The posterior lobe is closely related to metabolic processes and a deficiency leads to a noticeable increase in sugar tolerance with tendency to adiposity, subnormal temperature, somnolence, dry skin, polydipsia and polyuria, loss of hair, characteristic psychic—often epileptiform—disturbances. Functional excess, or administration of extracts, causes loss of flesh, intolerance for carbohydrates, even spontaneous glycosuria, a moist skin, etc.—symptoms, in other words, the reverse of those recounted above. Moreover secondary derangements of other glands occur, more notably the genital organs,—an apparent activation with hypophyseal hyperplasia, but definite anaphrodisia, even lack of development or atrophy, when then is hypophyseal hypoplasia. Indeed, certain types suggest functional hyperplasia of one lobe with lowered activity of the other, or, at one period, an overactivity and later a deficiency of both lobes.

Thus, pronounced acromegalics may show, in later stages, a tendency to put on weight, high sugar tolerance, somnolence, a subnormal temperature, anaphrodisia, etc., while in earlier stages or in exacerbations of the disease there is apt to be a reverse picture, active metabolism glycosuria, aphrodisia, hypertrichosis, etc.

Again, in the type of Fröhlich, there is a primary and chronic lowering of the activity of both lobes. In typical cases the symptoms date from pre-adolescence and the stature remains small because of anterior lobe implications, while the adiposity, genital dystrophy, imperfect secondary sexual characteristics, lowered metabolism, etc., indicate posterior lobe obstruction.

Also Cushing has described cases with adiposogenital dystrophy accompanied by skeletal overgrowth. Such cases may be accounted for by an overactivity of the anterior lobe and a deficiency of posterior lobe secretion. An internal hydrocephalus, pressing on the posterior lobe depressing its activity but apparently stimulating the more protected anterior lobe, seems to be the exciting cause. The hydrocephalus may be produced by a distant tumor.

Although the x-ray demonstration of an enlarged sella turcica is a very reliable diagnostic point in determining the presence of strumous, tumorous, or hyperplastic conditions of the hypophysis, it must be noted that many cases of dyspituitarism, especially in the last two groups discussed, may show no enlargement of the sella and yet may have a suprasellar or interpeduncular

or even more distant tumor, which may give glandular or even field manifestations without distorting the sella.

While the commonest field defect accompanying a hypophyseal growth is a bitemporal hemianopsia, it must be remembered as we have elsewhere pointed out that bitemporal hemianopsia, or tendency thereto, occurs only about twice as often as homonymous hemianopsia, or tendency thereto, in this group of cases. There are also many cases which become blind in one eye and have a temporal hemianopsia in the other eye, so that it may be uncertain to which class they belong. A considerable number also have shown, predominantly, a centrally scotomatous tendency in one or both eyes. Here again classification as to bitemporal or homonymous groups may be difficult in case one eye is scotomatous while the other eye is hemianoptic. Bizarre cases also have occurred which resist all attempts at classification. It is possible then to have almost any form of field as a neighborhood symptom of growths in the region under discussion. Particularly must it be remembered that ethmoidal and sphenoidal disease may produce central scotomata and temporal field defects, and that glaucoma may also give scotomata and defects between the macula and blind spot temporarily. True primary optic atrophies and toxic scotomata must also be differentiated.

In establishing the predominant characteristics of the field defects in these cases it is often necessary, and always advisable, to examine and record the field for a series of test objects ranging from 2 minutes to 8 degrees in visual angle. The former small sizes require a Bjerrum screen or a black curtain at 1 to 3 meters distance from the patient. A detailed discussion of these technical points as well as an elaboration of many statements in this compressed resume may be found in the following references:

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ORIGINAL ARTICLES.

THE SOCIAL MISFIT—A STUDY OF MISS X.

By F. C. STUDLEY, M. D., Milwaukee, Wis.

For many years past medical and lay literature has fairly teemed with terms more or less psychological, in an attempt to classify or describe mental variations from the usual or average, which do not constitute such a wide and prolonged departure from the normal as is embraced under the term *Insanity*. The very multiplicity of these terms, with the complex pictures which they present, attests at least to the intense interest which is taken in this subject. A few distinguishing expressions are the following: "Abnormal," "Constitutional Psychopath," "Morbid Personality," "Queer," "Crank," "Degenerate," all commonplace enough, heard by everyone, and conveying a meaning or delineation of a particular class of personalities we have met, and concerning whom we have variously attributed a slight or decided departure from the average norm—not insane—not a lunatic—but rather a "borderline" condition, a sort of neutral territory or frontier between health and disease, where obvious derangement is not evident, but where personality and behavior are unusual, where intellectual and emotional reactions are quite out of proportion, either diminished or too intense—but in whom a marked and distinguishing feature and consequence exhibits itself in inefficiency, misfitness and maladjustment to ordinary social conditions as we meet and consider them in every day life. Quite frequently these changes are striking defects along special or particular lines, associated or blended with a onesided overdevelopment, constituting real talents along other lines, producing striking contrasts, and a picture lacking in harmonious poise.

The changes or variations of which I speak you will find among the insane, and as well among the sane. You will find them in every social class, and the accidents of health or disease may determine and accentuate their appearance. No one of us is entirely free all of the time from strange and peculiar, almost imperceptible deviations from the normal, not only as compared to others, but as contrasted with our normal selves; and so it comes about that in this neutral territory, midway between the Normal and the Abnormal, "No-Man's-Land" it may be called, a very fertile field is offered to those who take pleasure in theorizing as to who is and who is not insane, or where sanity ends and insanity begins. You will recall

the admonition of the Quaker to his wife that "All the world is queer except thee and me, and sometimes even thee art a little queer."

The problem of the proper understanding and the handling of this class is one of considerable social importance for the reason that we have to live with them, support and suffer because of them, for their lives are ordinarily adaptive failures, and they are, or eventually become, social parasites on a community which does not understand or make allowance for them, and necessarily takes no interest in the alleviation of their condition. We have studied these personalities and, because certain neurotic or psychopathic elements were strongly in evidence, have classified them as Hysterics, Neurasthenics, Psychasthenics, or what not. For the convenience of classification, we have reduced a personal picture-complex to a simple, and arbitrarily separated a picture group, and created a species out of a family. But we have forgotten, or disregarded largely, the etiological influence of a tangled social life, of environment and accidental conditions or situations, lack of educational and home control, of proper and selective training, with the result that we have accentuated the congenital anomaly out of all proportion to the environmental influence. The method is helpful, but it is one-sided and insufficient. It has seemed to me that a complete study of these personalities should especially be considered from their social history. In the following study I have followed Moyle of Brookline in the grouping of the moods, habits, interests, etc., of my patient.

The case which I wish to present, whose history I shall record, and a certain analysis of whom I shall attempt, is Miss X. She is 22 years of age at the present time, of frail build, delicate blonde complexion, personally attractive, impressing one as essentially emotional and impulsive. I first saw her in June of 1915 when she had been referred to me by Dr. Y. She walked into my office with a very perceptible limp, leaning upon the arm of her sister, apparently for support. She is bright and sparkling in appearance, vivacious in manner, laughing one moment, crying the next, face flushed, her hat is askew, and her hair untidy and, as she seats herself in a chair, a very noticeable tremor of the entire body is apparent. After a few moments' conversation an attempt is made to examine the pupils of her eyes and to test the knee jerks, permission for which examination she refuses, turns her head away and sobs convulsively. This mood passes away shortly, and she comes out of the emotional attack smiling, but still refuses to permit any physical examination.

She appears, however, quite willing to talk, and from her I gather the following history. She was born in America of English parentage, attended public and private schools, had average marks in her

classes, was interested in history and philosophy, abominated mathematics, advances the information that she has always been an unruly child, that she could get along with no one. She states that formerly her father was a hard drinker and beat her unmercifully. Her mother died of tuberculosis when she, my patient, was eight years of age, and that, a few years later, her father married a woman of unsympathetic and unaffectionate disposition, whom she detests, cannot possibly get along with; that this stepmother punished her when she was eleven years of age for something for which she was wholly innocent, and that that night she induced another little girl to accompany her, and the two of them ran away from home, slept out doors and in barns, and were gone for a few days before they were discovered, walking along a country road, eating crackers. She further states that as a child she had a hateful disposition, was envious of the pleasures of other children, taking keen delight in climbing upon her woodshed and throwing stones at the other children who were playing about and having a good time, would slap their faces for no reason at all, unless it be that she hated to see them enjoy themselves. At fourteen years of age she attempted suicide for some reason she will not give but she states that the cause was trivial, and that at least two or three times since then she had made further attempts at self destruction by cutting at the elbow and the wrists. She adds with a smile that she cut deep but did not "go ahead with the job because it hurt." From childhood up to sixteen years of age she experienced three fainting attacks in which loss of consciousness was only partial. At fourteen she was sent abroad where she lived in the home of an uncle, returning to America after ten months, giving as the reason that the place was intolerable to her, for her uncle, a man of fifty years, fell in love with her, creating jealousy on the part of his wife. Upon her return home, finding her personal relationship with her stepmother no more congenial than it was before she went away, she next started out at fifteen years of age to do office work in the city of Milwaukee, which she continued at, intermittently, for a number of years, part of the time being spent at home, as she states, "scrapping with her stepmother." She recites one incident which occurred a few years ago in which she gave her stepmother a beating, the affair growing out of an attempt of her stepmother's to remove the felt mattress which she and her sister occupied, and change it over to the bed of her half sisters, and to give them in return an old excelsior one. She stood in the door way and refusing to permit her stepmother to remove the mattress, a slam-bang slapping, scratching, and hair pulling contest at once ensued, which did not terminate until both of them had fainted.

She states that she fatigues very easily upon slight exertion, that she suffers from chronic constipation and requires large doses of

cathartics every day. She wishes that she were dead. About a year ago she entered a nurses' training school, grew tired of it after a few weeks, attempted suicide which failed, then returned home, later taking up training in a Milwaukee Hospital, became dissatisfied with the doctors, who, she says, were careless, thoughtless, and left too much to the nurses, criticised the management, left in a huff, and started doing practical nursing. For the past seven years she has enjoyed the friendly council of a man forty years older than herself, and this relationship has occasioned a great deal of bad feeling between herself and her father, whom she considers unduly suspicious and critical of the gentleman's attentions. She will attend the theatre and dine with him, gather flowers in the country with him, and go driving with him "in his Ford." It makes little difference to her that the man is married and his wife objects, for she says "his wife is a cat, uncompanionable, and there is little in common between the two." Her father objects to these scenarios, and she waxes eloquent in her denunciation of the evil minds of men.

She states that her weight varies from 108 to 130 pounds, that she now weighs 108; her height is five feet four inches. The patient has a strongly prognathic under jaw, a typical Hapsburg, a small cranium, but there are no definite physical stigmata of degeneration. She complains of anesthesia of the entire left side of the body, her feet and hands go to sleep, and that, because of this numbness and weakness of her left side, she walks with a limp. She has frequently suffered from temporary aphonia, anosmia and ageusia. The globus symptom is present and decided. Appetite is poor. She cannot sleep without hypnotics, which she takes frequently. She has pain in her head, back and limbs, is lachrymose and apprehensive that she is going to lose her mind. She complains much of nausea.

The patient was assigned to a room and instructed to go to bed, which she quite promptly and positively refused to do, giving as a reason that it would make her more nervous. She guessed that she would go back home. Next she asked whether I could give her some work to do, and upon a provisional promise to do so later on, she retired to her room, went to bed, but refused to take her bath or massage, threw her medicine out of the window, and said she guessed she would have her own way. For the next two weeks, during which time she was in bed, she exhibited the tremors and gyrations of major hysteria.

This then is the introductory history of the patient Miss X, whose subsequent behavior, philosophy of life, intellect, estimate of herself, ability to meet ordinary circumstances, moods, instinctive demands and traits, interests and hobbies, and a summary of whom I shall attempt with many misgivings to analyze.

I would state at the outset that Miss X exhibits no signs of delusions, phobias or definite obsessions, and her physical condition is negative as to the presence of any organic trouble.

Intellectually Miss X is far from superficial, but her modes of intellectual activity, and these determine intellectual character, are automatic, and any particular state of her feeling practically determines her thought sequences. Her education was that of the average girl in her station of life, and since she left school she has read some, traveled some, and for the most part has observed and remembered what she has seen, but her judgments and conclusions are unusual. Her mental action is quick—there is certainly no retardation in the thought rate—but she has neither the inclination nor the capacity for sustained or prolonged attention and mental effort. Her perceptions are quick and very keen, but she tires easily. In her relationship with others her constant habit of mind is to vent her own opinions, and these same opinions are delivered with a jerk and a sting. Her psychic life as exemplified in her conversational intercourse with others is not of the give and take variety, but rather she seeks to open up and dwell upon particular lines of thought ordinarily regarded as morbid, and concerning which she has many preconceived and distorted opinions. Miss X is essentially one who jumps at conclusions. The reasoning power depends necessarily upon the proper action of memory, reflection, and the capacity to aggregate and decompose complex ideas, in which the sense of proportions and comparison plays the determining part. One cannot reason deeply and correctly without the capacity to generalize, and judgment represents a summary expression of the entire process by which we arrive at a decision. Without the capacity for sustained attention judgment must necessarily be defective. Miss X will follow an argument very closely for a short period of time—she is a fair observer—but she has fundamental beliefs and disbeliefs which are instinctive, and fatal to that open action of the intellect necessary for the operation of correct judgment. Her father once told her a lie, she states; therefore and thereafter she will never in her life believe him again on his oath. She sees no sense or reason in the social demand for observation of the conventionalities of life. Why should anyone desire to appear that which they are not? "People are liars—ought to admit their faults—it is all hypocrisy and imposture." She is a misanthrope of the cynical school, but only for the time being—not constantly. Her philosophy carried out to its logical end would require that everyone of us expose to the entire world each error or mistake real or imaginary that we had ever committed, and produce a stagnation of all human endeavor at improvement. Consistently she herself is not only quite ready but boastfully desirous of informing the entire world exactly what she is and thinks; but she wants fair play.

Miss X is not without regrets for her mistakes of judgment as they determine her logical conduct. She suffers very keenly at times because of her hasty and fallacious judgments—and then, but only momentarily, she is quite ready to ask for forgiveness, and to condone out of all reason the wrong acts of others. She suffers very keenly through a trick of her memory or a prank of her mind, where the vivid recollection of every wrong act she had ever committed since she was two or three years of age would appear before her and cause just as acute mental suffering as she experienced at the time of their occurrence. She sees nothing in life worth living for. She admits that she is not usual, for whereas the primal instinct is to continue existence, and to shrink at death, her desire is to cease existence; she further states that this frame of mind has existed in her since she was fifteen years of age.

As to her *habits of life*, it is to be stated that these are largely determined with her, as with all of us, upon the presence or absence of any real motive in life. Habits are expressions of mental tendencies, and where these are helter-skelter, then the habits of life will be likewise. Miss X is without any definite motive in life—she is essentially a drifter—she cares nothing, as she states, for anyone, and conversely she believes that no one cares anything for her. She has a colossal distate for work of any sort. Work is inartistic and does not appeal to her. She is keenly alive to the matter of personal comforts and discomforts—she likes pretty things to wear—she likes caviar and lobster immensely—and, as she receives no financial help from home, and must of necessity put forth some struggle to secure ordinary comforts and luxuries, she will occasionally work for a few weeks or a few months to satisfy this demand; but her work is spasmodic; she will go with a rush at anything she starts, and in a few hours will exhaust her energy, become indifferent, apathetic and quit. She will lie in bed until eleven or twelve o'clock in the morning, dress and remain up for a few hours and then return to her bed where she will lie and think. She wishes that we could prescribe something to stop this thinking. She plans to go to Tennessee or to Sashkatchewan to get away from herself, but her plans end there and she gets nowhere. She has in mind the starting of a chicken farm, and at the Sanitarium she is given free rein to take care of the poultry and ultimately to earn their purchase and control. She is enthusiastic over this work for possibly three days, up early in the morning, looking after the poultry yard generally, and soon she again remains in bed and designates another to look after the work. Her personal friend Miss G. wishes to take a vacation for a couple of weeks, and she offers to substitute as night nurse for this period of time. She serves in this capacity for one night and a half and then is forced to give up the work because it is too lonesome and she cannot sleep

by daytime, and, forgetful of her obligations again takes to her bed, where she remains half remorseful, half at loggerheads with the world, and refuses to eat for days. Of herself Miss X says: "I can't say that I have any particular motives in some moods, but in others my chief motive is in showing up all the defects in certain persons, in driving to the bottom of all things that appear foggy and hazy. The motive mentioned above is among the few enjoyments that I am conscious of."

As concerns the *proper estimate of herself*, Miss X tells us that she fully recognizes her abnormality. She knows that she is unruly, abnormal, and a degenerate, and is convinced that nothing can be done for her. Quoting her own words Miss X states as follows: "My self-estimate is that I am an ordinary crazy damn fool. I neither care to live nor give anyone any further annoyance by trying to uncease myself. I am ordinary to myself; I would not be what I am if it were not what I think is usual or right to be." She takes much pleasure in her self-revelations, many of which concern pseudo-love affairs, engagements, the indecent attentions of men, etc., but states that she was never actually in love. She admits that she is selfish, and she glories in it; but she considers altruism a spineless something which one does not feel at all. "This is more imposture." For what she is she blames her father, for, she explains, he is exactly like her, and for that reason had no right to beget her, to bequeath to anyone a disposition and temperament like hers. She lives and is—therefore it is her father's fault. She admits the hysterical nature of many of her physical symptoms and believes that in some of her mental outbreaks she must have been insane—as for example when she took a hearty dislike to one of my assistants, raced through the corridor of the building, dodged behind chairs and bureaus—gave the doctor a blow in the stomach, one in the face, then went through a hysterical saltatory spasm—scratching, biting, and screaming—and had to be carried to the control department, where she immediately became composed. She takes great delight in recounting this experience but only regrets that she did not succeed in smashing the doctor's eyeglasses as she had intended to. She says that she is mean, ugly, horrid but she makes no excuse and she asks no sympathy for herself—she simply does not care what people think of her. She resents kind attentions and indignantly resents attitudes of consideration. She takes apparent pride in her suicidal reminiscences, her tantalization of other girls, the attempts of her father to place her in the detention home, her incorrigibility and downright cussedness. She modestly asserts that her opinions are of little value, but the obstinacy and determination with which she proclaims and adheres to her iconoclastic notions belie her modest statement. Miss X "wants what she wants, when she wants it."

What is to be said as to the ability of Miss X to adapt and accom-

modate herself to society, to the world as it actually is? Her sheer and utter failure in this respect is perhaps the most striking point in any estimate of her unhappy plight and career. Her entire life is a panoramic history of adaptive failure. The childish and petty jealousies, envious attitudes, and incorrigible characteristics of her early life manifest themselves later on in a hypercritical attitude toward everyone except the choice few whom she momentarily idolizes.

She is sociable—yes—toward a few—but in the sense of being a good mixer, caring for people upon an equal basis with herself, then she is very far from being a normal sociable person at all—for her thought is mostly of herself—seldom of others. The constant fault finder, the one who is engaged in the habitual occupation of tearing to shreds the character of others, the misanthrope, the man and woman devoid of hope and of all motive in life, can hardly be expected to properly adapt themselves to this workaday world where a premium is placed upon qualities the exact antithesis of those I have described, where tact and sympathy and self-repression, tolerance of the opinions of others, sustained attention, and frank cheerfulness are such fundamental prerequisites to successful adaptation. In her capacity as nurse, for short periods of time, Miss X will give the outward appearance of cheery and soldiery obedience to the doctor's direction, but secretly she is distrustful and at times quite openly antagonistic. She is very sincere in this impossible attitude and one might think from the stand which she assumes that Solomon was in his temple and the doctor was on trial.

Miss X became ultimately at loggerheads with everyone in the Sanitarium, she interfered with the work of the head nurse and the hired man, the stenographer and the house-keeper, she slandered the staff, mistook good for evil intentions, was pessimistic, arbitrary, imperious and unmanageable, did exactly as she pleased, took delight in attempting to upset plans and schedules, and gloried in an "independence" which was as unbecoming as it was unreal. She was unusually keen and alert in discerning and then ridiculing the weak points of others (artistically to be sure) a habit of mind as harmful to the subject as it is to the victim. There is just one exception to this unsympathetic role which characterized her, and that was a genuine sympathy which she felt for the chronic and incurable demented cases, and concerning them she was very frank in an opinion which she disclosed to everyone in the house, that it was the moral obligation of the doctor to chloroform such patients to end their misery and put them out of the way. Law or no law, if she were in charge of the Sanitarium, that is exactly what she would do. As to the consequences of such wholesale euthanasia she had little regard. I presume that one of the strongest arguments for the personal conviction of the fatuity of continuing existence in a

sane person is a carefully planned and definite attempt at suicide. It is not necessarily presumptive evidence of insanity to know that one either attempts or succeeds in taking his or her life. There are repeated instances of those who commit suicide who in no sense at all are to be considered insane. Miss X made a well thought out and deliberate attempt at suicide at The Riverside Sanitarium in March of 1916. She had come to the Sanitarium for the purpose of remaining for a few days as she wished to stay away from home during a period of time while her stepmother was giving dinner parties. She did not wish to annoy her by her presence at home. The next day she passed the casual remark "You have been very kind to me, but I am going to do an awfully mean thing to you; don't ask me any questions about it, for I will not tell you, and you might prevent it." She would not disclose what she had in mind, and I confess that at the time I attached little importance to what she said. A couple of days later and following a pleasant evening she had enjoyed at the theatre with a friend, she sent for me about three o'clock in the afternoon. She was in bed, and when I asked her what she wished, her reply was, "Well, Doctor, I have done it; don't ask me what, but it will be all over by night." The pallid face, the contracted pupils, the odor of the breath were immediately apparent, and I asked her if she had taken morphine. She replied that she had taken between two and one-eighth, and two and one-quarter grains of the drug hypodermically. She exhibited six big hypodermic blotches on the side of the thigh and leg. The unsuccessful attempt which she made was absolutely definite and the reasons which she gave were that she cared for no one and that no one cared for her, that her mother was jealous of her, that she had no right at home, that the struggle to support herself was intolerable, that she owed everybody, and that her total present capital was two cents. She saw nothing in life worth living for. No, I believe that it may fairly be stated that Miss X is definitely defective in her capacity to adapt herself for any length of time to the ordinary exigencies of life, and this particular defect in social adaptation is the strongest characteristic in her anomalous make-up.

Miss X is essentially a victim of *Moods* and caprices of conduct as changeable as the weather. The day following her ineffectual attempt at suicide, she was a quite happy recipient of floral tributes from friends, exuberantly jolly one hour, pensive and depressed the next; changes in facial expression were lightning-like throughout the day. Two days later she was up and about and again mistress of the chicken coop—all business and activity. In the afternoon she sat for hours the picture of woe. Upon occasions she would barricade her bed-room door—put a notice on the outside "Do not disturb," and an hour later, from a condition of deep despondency, she would emerge simply scintillating with joy, "all dressed up and

no place to go" as she would say. We never knew exactly what to expect from Miss X, and so I was not especially surprised when she presented herself one evening at my office, clad simply in her kimona, looked in and said "good evening," turned about and went out of the front door, across the street to the Downer grove, "the jungle" as she called it, and gave us a half hour's chase through the woods, anticipating another suicidal outbreak, after which she quietly returned, remarking that she had enjoyed the evening immensely, the night air, the woods, and the moonlight, and thought that she would sleep well. The moods of Miss X are frequently colored with great irritability and to such extent that she would bang things about in her room and would refuse to see anyone. It was essentially in such moods as these that she would finally leave the house in a huff, state that she was going out on a "stew fest" and, as a matter of actual fact, would return to the Sanitarium mildly exhilarated with wine and be very good natured. Miss X would treat her father with the utmost consideration and courtesy, upon some occasions when he called and upon other occasions, would berate him by the hour. She saw no reason and felt that there was no reason why she should love, or care for, or show any more consideration for her father or brother or sister than she would for others, simply because they were her relatives. If they did not measure up to the standard which she established, the accidental incidence of relationship made no difference in her treatment of and estimate of them. She says of herself: "My moods are ordinary moods. We are all of us what society has made of us—not what nature made us. I am probably more natural than you because I reject unnatural conditions from my life. I judge my actions as they are. You yourself would be far better off if you thought as I do." Concerning her moods, Miss X states further "they are helter skelter—any old way—sometimes they last 'Three Weeks,' or its sequel 'One Day'—sometimes one minute—once in a while four years; but you never can depend upon them for regularity."

Miss X is peculiarly *instinctive*. She is the type of personality which forms quick and spontaneous friendships and, when she does genuinely care for another, as she has for several in the past, she can be most agreeable, amiable, and entertaining. She would do anything in the world for her new idol, her generosity upon such occasions being as complete as it is impulsive—but, by the same reason, she is just as quick to ask for the return of her gifts and peace offerings. Impulsivity is an essential trait in the life of Miss X, and this it is which leads her to form temporarily at least, companionships in which she appears to be absolutely fascinated. I have in mind the strong attachment which Miss X has for Miss Z. This attachment amounts to practical idolatry. Miss Z is a nurse, a rather odd, over credulous, and sincerely piquant personality, an Irish girl of strongly religious temperament and brim full of quiet

humor. Miss X will scream with laughter at everything which Miss Z will say or do. She never tires of hearing the praises of Miss Z sounded. It is not really a fair companionship, for Miss X would not for a moment think of considering Miss Z as her equal intellectually, socially, or any other way, but she is intensely amused and enthralled with her. When Miss Z, who thinks kindly of Miss X, attempts to advise or counsel her, Miss X will sit and scream with enjoyment at what she considers an absurdly unique and paradoxical situation. Miss X has never had any real love affairs, although she admits that she was engaged to an English lad whom she presumes is now either in the trenches in France or else dead, and, for her part, she sincerely trusts that he is dead. Her attachments are more for those of her own sex, than for those of the opposite sex although she is not really averse to the companionship of men, still she sees nothing attractive in them. Men, she says, are all alike and the instincts of most of them do not appeal to her.

Concerning her *general interests*, it may be said that Miss X is a good reader, mostly of fiction. She enjoys "larks" and a tame and innocent one is quite as agreeable to her as a wild night ride. After all, the main issue with Miss X is that the so-called "lark" serves to kill time—dissipates for her the torture of thinking—and with Miss X thinking spells misery—a hyperesthesia of intellection, in which painful recollections imperatively hold her attention. Miss X is interested in many things superficially and for a short while, not deeply interested in anything. She loves flowers, pretty dresses, and, occasionally, wine and cigarettes. She enjoys the theatre and moving picture shows. She would like to travel, she cares nothing for dancing, and she has no beaux, she hates nursing. She takes no interest in religious matters. Miss X says that deep down in every thinking person's heart, they know that the belief in immortality is simply the ignorant worship of a superstition, that death means disintegration and that no matter what her body is ultimately changed into, it will at any rate not be "she"—herself. She has no desire to live after death, for, she adds with a smile, "it might be worse than this." Concerning her interests in life Miss X says: "I have no interests, but I delight in going into a poor home; in taking care of a lot of dirty, sticky children for an ill mother; in cleaning and scrubbing up the house as it never has been cleaned and scrubbed. I like to tell children fairy tales, and then the pleasure and disappointment when, on some morning, they find me gone, bag and baggage, address and all without leaving a bill behind. I like to sit down and imagine how they acted and felt and how relieved they were. Also I like to go to the movies."

She has been a collector of stamps, of clock stones, butterflies and insects—not that she cared for them, but it was a fad and she wanted to excel any other and get the best and biggest collection—and she did until the very name of clock stones, stamps and butter-

flies made her shriek, and she finally gave them away to her brother and dared him to ever mention them to her again.

Such then is Miss X. For what she was born we must thank her progenitors. For what she is, a girl with definite infirmities, without hope, and without any deep motive in life, irritable, moody, neurotic, lacking in self-restraint, and judgment, without the influence of a mother's control and friendly counsel, precocious, and in many respects with qualities which might have suffered modification or development, we can acknowledge with many regrets the influence of the accidents of environment possibly equal to that of heredity. Her entire history leaves no doubt as to the complex psychic and neurotic picture she presents, nor as to the congenital nature of many of her troubles, modified by the accidents of environmental conditions during the adolescent period of her development. It would be rather difficult to label Miss X with any one name that would adequately classify her or group her symptoms. It is essentially a disease of personality in which an abnormal mental independence and utter carelessness of the feelings of others stands out strongly. She is a slave to her illogic, and she is hidebound by notions and beliefs that are quite at variance with those of the average socius. She might be called a Neurasthenic, a Psychasthenic, a Hysteric, a Borderliner, a Constitutional Psychopath, or what not. She is all of these at once or at separate times, but, socially, Miss X is a misfit no matter where we may individually desire to classify her. I do not use this term for the purpose of adding another word to our already voluminous nomenclature. I use the term "Social Misfit" because it is appropriately used concerning a group of cases as they are studied from the social standpoint, and the study of the class of which Miss X is a type tends to inform us of the complexity of the picture, and that environmental influence may have an etiological importance as well as phylogeny.

Is it possible that bickering, recrimination, unjust accusations, a hypercritical attitude, the sordid and ugly minded things of life, petty jealousies, nagging criticisms, suspicions and persecutions, carried to a degree which overwhelms the power of the organism to resist may not largely determine the complex which I have described?

The protest of Miss X against the world might be interpreted in the words of Masfield:

"What was good in me, you sneered at,
What was sweet in me you soured,
What was bright in me you dulled."

My belief is that she will ultimately take her own life because such an end is a probable and logical sequence of such a pathological personality, modified as it has been by a train of accidental circumstances in her life, unfortunate in themselves, but necessarily accentuating its pathology.

A STUDY OF CHEMICAL BLOOD FINDINGS IN VARIOUS SURGICAL CONDITIONS, WITH SPECIAL REFERENCE TO PROGNOSIS AND A COMPARISON WITH THE PHENOSULPHONEPHTHALEIN OUTPUT.*

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We wish to present the results of an investigation regarding the comparative usefulness of the new blood chemical methods and the usual urine tests, together with the estimation of the phenolsulphonephthalein output. This investigation was designed with one principal object in view, namely to show whether or not these new blood tests will give to the practical surgeon any more information than is obtained by (1) routine urinary examinations and (2) estimation of the quantity of phenosulphonephthalein excreted.

It might be well at the outset to review some of the main points concerning nonprotein nitrogenous metabolism before entering upon a discussion of the application of the new tests in this special study. These methods, which are largely colorimetric, owe their introduction into the clinical laboratory to the efforts of Folin, Benedict, Meyers and Fine. They have practically superseded the older methods of blood chemical analysis which were in vogue for some years in biological chemical laboratories. The advantage of these newer tests over the older ones is that they require but a small quantity of blood, and that they can be rather rapidly carried out in well equipped diagnostic laboratories.

The ingredients which are ordinarily searched for in order to determine kidney function are—uric acid, urea nitrogen, creatinine, and sugar. We have not included cholesterol because its clinical importance has not yet been scientifically determined. It might be well to state at this point the normal concentrations of these various ingredients in blood. This will be found covered in Table 1.

The normal amount of urea nitrogen in blood is 12-15 mgms. per 100 c.c. of blood; of uric acid 1-3 mgms.; of creatinine, 1-2.5. The percentage of sugar normally present in blood is 0.08-0.12. Another important figure is the volume percent of CO₂ combining power of plasma, which is normally from 53-77. This means that under normal condition blood plasma will take up from 53-77 of the combined carbon dioxide that is blown into it. We determine this by means of the Van Slyke method, which, by the way, is one

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of the best tests of acidosis. In conditions of acidosis, the combining power drops to 50 and below. The normal elimination of phenolsulphonaphthalein in two hours is from 60-85 percent, according to Geraghty and Rowntree's figures.

Table 1 also gives figures found under abnormal conditions. For instance, in chronic nephritis we may have an increase in the concentration of the urea nitrogen of from 15-50 mgms.; of uric acid from 1-4; of creatinine 1-3. In that condition of severe nephritis which is called uremic nephritis, we may have an increase of urea nitrogen of from 80-100; of uric acid from 4-15, and of creatinine of from 4-34. There is also a slight rise of blood sugar in this

THE CHARACTERISTIC BLOOD PICTURES IN GOUT, DIABETES & NEPHRITIS II				{ UREA N, URIC ACID, CREATININE & SUGAR }
DISEASE	UREA N	URIC ACID	CREATININE	SUGAR
	MGMS. PER 100 ^{cc} of BLOOD			PER CENT
NORMAL	12-15	1-3	1-2.5	0.08-0.12
GOUT		35-6		
MILD DIABETES				0.15-0.30
SEVERE DIABETES				0.30-1.10
CHRONIC NEPHRITIS	15-50	1-4	1-3	
UREMIC NEPHRITIS	80-300	4-15	4-34	0.10-0.20
THERMIC FEVER	UREA N 26- 89	URIC ACID 6-14	CREATININE 3-6.1	SUGAR 0.15- 0.20

Table 1.

condition, and likewise a drop in the carbon dioxide combining power, down to as low as 20. The phenolsulphonaphthalein output is also low in uremic nephritis, down to as low a point as 10 and even 0. The table shows, too, that, in diabetes, the blood sugar increases anywhere from 0.25 to even as much as 1.10 percent, which latter figure is the highest recorded increase of blood sugar.

Table 2 shows a more elaborate picture of the characteristic blood conditions than that just described. This table gives, in addition to those figures already catalogued, the amount of total solids, total nitrogen, non-protein nitrogen, creatinine, chlorides as sodium chloride, and cholesterol.

It has been determined by numerous investigations that the first change that occurs in debilitated kidney functions is an accumula-

tion of uric acid in the blood. In other words, the first ingredient to be stored up in blood when the kidneys begin to show deficient elimination of phenolsulphonephthalein is uric acid. This is manifestly due to the fact that uric acid, of all the blood ingredients, is the most difficult for the kidney to get rid of. It is evident that when an organ is disturbed in function, the ingredient which is the most difficult to handle is the first one to be damned up. As the functional activity of the kidney continues to be weakened, urea nitrogen becomes stored up in the blood.

The last ingredient to be stored up—and this occurs in severe cases—is creatinine. Creatinine is the easiest ingredient for the

THE CHARACTERISTIC BLOOD PICTURES in GOUT, DIABETES & NEPHRITIS.										
DISEASE	TOTAL SOLIDS	TOTAL NITROGEN	NON-PROTEIN NITROGEN	UREA NITROGEN	URIC ACID	CREATININE	CREATINE	SUGAR	CHLORIDE AS SODIUM CHLORIDE	CHOLESTEROL
	PER CENT		MGMS. PER 100		PER 100		BLOOD		PER CENT	
NORMAL	20.0	3.00	25-30	12-15	1-3	1-2.5	5-10	0.08-0.12	0.65	0.15
GOUT					356					
MILD DIABETES								0.15-0.30		
SEVERE DIABETES	17-20	1.8-2.9						0.30-1.10	0.57-0.61	0.15-0.30
CHRONIC NEPHRITIS	13-19		30-80	15-50	1-4	1-3			0.54-0.75	0.17-0.35
UREMIC NEPHRITIS	12-18	1.7-2.7	120-350	80-300	4-15	4-34	5-31	1.10-0.21	0.48-0.64	0.17-0.35

Table 2.

kidney to eliminate, therefore it is the last one to be blocked. The order of accumulation of these ingredients in blood in kidney disease is consequently uric acid, urea nitrogen and lastly creatinine. The accumulation in this order has been well described by Meyers and Chase under the description of the "Stair-case" accumulation of the non-protein nitrogenous constituents. We would expect, therefore, in the beginning of kidney derangement to find only an increase of the uric acid. If the case were moderately advanced we would expect to find also an increase of urea nitrogen present. If the case were far advanced, we would expect an increase of uric acid, urea nitrogen and also creatinine. An increase of creatinine, therefore, portends disaster, so that when the concentration of creatinine is in the neighborhood of 5 mgms., or over, we are

warranted, according to all recorded experience, in making a fatal prognosis. The finding of over 5 mgms. of creatinine per 100 c.c. of blood has always been followed by death of the patient within one to two months after the accumulation has progressed to that extent. This observation has been made by one of us in a variety of conditions, principally in connection with studies at the City Hospital on cases of chronic interstitial nephritis.

In the summer of 1916 a group of cases of thermic fever was studied also, by Dr. Schisler and one of us (Gradwohl), in which particular attention was paid to the creatinine content of the blood with respect to prognosis. In no case did the blood chemical

BLOOD ANALYSIS										URINE ANALYSIS★									
CASE	DATE	OUTCOME	URIC ACID				SUGAR				REMARKS	SPECIFIC GRAVITY	ALBUMIN	SUGAR	ACETONE	DIKETIC ACID	INDICAN	MICROSCOPICAL EXAMINATION	REMARKS
			URIC ACID	URIC ACID	URIC ACID	URIC ACID	URIC ACID	URIC ACID	URIC ACID	URIC ACID									
O'Conner	8/1	DIED	33	132	400	150					Retention high. Patient died SAME DAY.	405	+	neg	neg	neg	neg	Moderate number of coarsely staining casts and red blood cells. Occasional leukocytes.	FINDINGS SERIOUS
Fischer	8/2		32	86	41	102					High retention indicating probable fatal outcome. Patient died two days after creatinine reached 5.0 mgms per 100 cc.		++	+	+	+	++	Moderate number of granular casts and epithelial cells.	Urinary findings indicated some marked renal disturbance, but not same importance as blood findings.
	8/3		39	98	454	105							++	+	+	+	++		
	8/4	DIED	39	79	447	100													
	8/6		45	71	294	1054							neg	neg	neg	neg	++	Moderate number of epithelial cells, leukocytes and finely granular casts.	
	8/8		44	88	24	111													
	8/10		55	69	50	1074													
	8/12		89	82	50	120							neg	neg	neg	neg	++	Very many granular casts and occasional leukocytes. Such number of casts is rarely seen.	Remarkable number of casts on last day of life.
Huth	8/12		26	96	330	104					Retention not high. Patient recovered although clinical signs seemed bad.		++	neg	+	+	++	Moderate number of coarsely and finely granular casts and occasional leukocytes. Very occasional indican.	
	8/13	LIVING	14	33	20	1020							neg	neg	neg	neg	++		
Ship	8/13	DIED	76	141	61	1007					Clinical signs bad. Retention high, attracting attention to fatal prognosis. Died one day later.		very neg	neg	neg	neg	++	Moderate number of epithelial cells and leukocytes very occasional red blood cells. Test fairly granular. Casts found after a prolonged search.	
Muich	8/14		19	33	30	1070					Observation made when convalescent.								

★ = Very large amount
+ Moderate amount
++ Small

★ Very large amount
+ Moderate amount
+ Small amount

Table 3.

analysis run counter to the ultimate fate of the case, although in one instance at least the clinical symptoms appeared favorable in the presence of more than the fatal quantity of creatinine: the individual died, however, thus confirming the great value of this finding.

It is to be noted that some cases of nephritis, particularly those corresponding to what the anatomist chooses to dignify as chronic parenchymatous nephritis, may be on the very last lap of life, with exitus lethalis close at hand and yet the creatinine does not necessarily exceed 3.0 or 4.0 mgms. Its prognostic value therefore, is only valuable when it is high. A low creatinine content naturally does not exclude the possibility of impending death. The table which we append here (Table 3) gives the blood and urinary find-

ings in this group of cases of thermic fever. The condition so far as the kidney function is concerned, closely simulates uremia.

The material for this study of the comparison between blood chemical findings and the phenolsulphonephthalein test consisted in the main of obstructive conditions of the lower urinary tract, in which there was more or less backpressure on the kidneys. Some of these cases suffered from nephritis as well.

It has always seemed plausible to expect more important information from chemical studies of this kind than from the power of the kidneys to eliminate an inert dyestuff such as phenolsulphonephthalein. We assume that the cause of the severe symptoms in nephritis is impending or advancing uremia, and that the cause of the uremia is deficient elimination through the kidneys. Whether the ingredients in blood which we are analysing represent the substances themselves that produce the toxic symptoms, or whether they are simply an index of the toxic state, is beside the point for the purpose in hand. We believed from our studies on internal medical problems that the blood chemical methods on this, a most important surgical problem, would serve us in good stead.

The estimation of kidney function by the determination of the ease and speed with which a chemical dye can be eliminated through them seems somewhat rash, in theory and in practice. Because a dyestuff is eliminated with a certain degree of ease, it does not follow that the byproducts of metabolism are similarly passed out through such kidneys. In referring to chemical dyestuff tests, we allude more particularly to the test of Geraghty and Rowntree, for of all the color producing substances that are used in kidney functional work, phenolsulphonephthalein is the most commonly used and quoted because of its ease of administration, its harmlessness, and the rapidity of testing for its presence in voided or catheterized urine. Within certain limitations it gives a fairly good picture of kidney function, still it manifestly cannot give the observer the same intimate picture of metabolic processes and real kidney efficiency or deficiency which goes with a complete blood chemical analysis.

The work of Folin, Fitz, Frothingham, and Denis on "The Relation Between Non-Protein Nitrogen Retention and Phenolsulphonephthalein Excretion in Experimental Uranium Nephritis," gives a very good view of the exact value of each method of investigation from a purely experimental standpoint. These experiments showed that there was a wide difference in the figures of the phenolsulphonephthalein test and the blood chemical data; that at the beginning of the nephritis, the phenolsulphonephthalein elimination dropped more rapidly than the accumulation of nonprotein nitrogen and urea of the blood. During the course of the disease the height of the nitrogenous accumulation is reached from two to three days

later than the lowest level of the phenolsulphonephthalein excretion. Nonprotein nitrogen and urea accumulated in the blood and returned to normal gradually, in these rabbits, as recovery of the kidney occurred. These observers maintained that, in general, these two tests paralleled each other, but with this essential difference; the amount of phenolsulphonephthalein excretion showed the kidney function at the moment; the amount of nonprotein nitrogen and urea in the blood is rather a measure of an accumulating difference between the amounts of waste nitrogen produced in the metabolism and the amounts eliminated by the kidneys. The time element, the duration of the condition, constitutes therefore a most important factor in the comparison of these two tests. The phenolsulphonephthalein test indicates the function for the *moment*, the blood chemical tests indicate the true *grade* of the working power of the kidneys.

These experiments upon rabbits represent the earliest definite comparative tests of these two methods. The conclusions of Folin and his collaborators have been well borne out in practice. We know that there are many cases, with little or no phenolsulphonephthalein excretion, that are badly deficient, and show high retention of nonprotein nitrogenous blood constituents; we know also that there are some cases, with decreased phenolsulphonephthalein output, that are functioning quite well, as judged by the nonretention of these ingredients of blood; we also know that there may be a normal phenolsulphonephthalein output and a marked retention of the blood constituents. These three sets of conditions would therefore make us pause in accepting alone the evidences of kidney function from the phenolsulphonephthalein test alone. Our personal experiences with a comparison of the two methods have forced us to the conclusion that the estimation of kidney function, in so far as it interests the urologist, cannot be intelligently viewed from the standpoint of operative risk without a survey of the percentage of these blood constituents, as well as the phenolsulphonephthalein test.

A study of table 4 gives the detailed results of the blood chemical and phthalein investigations on the series of urological cases which we selected for this work.

A study of these figures gives some very interesting facts. In the first place, Case No. 1, of stricture of the urethra, at the time of the first examination, gave absolutely no evidence, from a clinical or urinary standpoint, of any disturbance in the kidneys. Nevertheless, when we found 44 mgms. of urea-nitrogen, 6.5 uric acid, 3.93 creatinine, we immediately made a serious prognosis, regardless of the fact that this patient at this time was up and about the hospital wards apparently in good condition. Within forty-eight hours this patient went into uremia, at which time

his blood findings were urea-nitrogen 50, uric acid 4.9, creatinine 4.39. At this time a fatal prognosis was made. A few days later, another examination showed more increase of all the ingredients except creatinine. It is also to be noted that at the time of the first examination the phenolsulphonephthalein excretion was nil. At the time of the second examination, with clinical symptoms worse, with blood chemical findings worse, there was an improvement in the phenolsulphonephthalein output. Then there occurred a drop in this figure. It might be added that this patient died six weeks after the time of the second examination. In this case the

COMPARISON OF BLOOD CHEMICAL FINDINGS AND PHENOLSULPHONEPHTHALEIN EXCRETION.											
BLOOD						URINE PHTHALEIN EXCRETION					
NO.	NAME	DATE	OUTCOME	UREA N	URIC ACID	CREATININE	SUGAR	ALBUMIN	CASTS	PHTHALEIN 2 HOUR OUTPUT	REMARKS
				MGMS. PER 100 CC	PER CENT			★			
1	D. J.	1/13/17		4.4	4.3	3.93	0.120	+	---	NONE	NEPHRITIS, STRICTURE, SEPSIS.
2	"	1/27/17		5.0	4.9	4.39	0.118	---	---	2.0	
3	"	2/2/17		6.3	4.0	4.00	0.171	---	---	TRACE	
4	"	2/7/17	DIED	5.5	4.9	3.85	0.144	---	---	TRACE	
5	J. C.	1/24/17	DIED	2.0	4.1	1.93	0.118	---	---	4.1	CANCER OF PROSTATE.
6	C. S.	2/2/17	IMPROVED	1.2	2.3	1.04	0.117	++	GRANULAR	3.7	ENLARGEMENT OF PROSTATE.
7	R. E.	2/2/17	IMPROVED	1.2	2.7	1.08	0.090	++	GRANULAR	2.7	ENLARGEMENT OF PROSTATE.
8	D. B.	2/4/17	IMPROVED	3.1	3.1	1.97	0.126	+++	---	3.1	PARAPHIMOSIS.
9	G. W.	2/4/17	IMPROVED	1.6	2.4	1.15	0.120	---	---	6.0	STRICTURE OF URETHRA.
10	J. E.	2/4/17	DIED	13.5	9.9	5.00	0.200	---	BLOODY	NONE	CHRONIC INT. NEPHRITIS & HYPER. PROSTATE
11	P. K.	2/23/17	IMPROVED	1.2	2.3	1.20	0.118	---	---	6.5	PHIMOSIS.
12	O. M.	2/24/17	IMPROVED	1.3	2.4	2.06	0.108	---	---	2.2	STRICTURE OF URETHRA.
13	H. H.	2/24/17		1.2	2.9	2.06	0.111	---	---	4.7	ENLARGED PROSTATE, TRANSURETHRAL RESECTION
14	R. W.	2/26/17	IMPROVED	1.1	2.1	1.25	0.103	---	---	6.9	STRICTURE OF URETHRA.
15	"	3/2/17		4	2.6	1.14	0.090	---	---	8.0	ENLARGED PROSTATE
16	C. W.	2/28/17	IMPROVED	2.3	5.9	1.62	0.114	---	---	NONE	STRICTURE OF URETHRA.
17	J. C.	2/18/17	IMPROVED	1.3	5.7	1.23	0.108	---	---	4.0	HEMIA.
18	J. K.	3/18/17	IMPROVED	1.8	2.0	1.62	0.108	---	---	3.1	TRANSURETHRAL RESECTION, TUBES?
19	H. H.	3/12/17	IMPROVED	1.1	3.3	1.16	0.102	---	---	4.7	STRICTURE OF URETHRA.
20	R. B.	3/12/17	IMPROVED	1.8	2.5	1.70	0.134	---	---	2.2	RETENTION OF URINE.
21	M. K.	3/17/17	NO CHANGE	1.6	3.4	2.15	0.114	---	---	TRACE	ENLARGEMENT OF PROSTATE.
22	L. H.	3/17/17	IMPROVED	1.4	3.5	1.16	0.114	---	---	---	ENLARGEMENT OF PROSTATE.
23	J. D.	3/18/17	OPERATED	1.2	2.5	1.25	0.120	---	---	5.0	ENLARGEMENT OF PROSTATE.
24	W. P.	3/18/17	IMPROVED	1.2	1.2	1.13	0.117	---	---	4.8	ISCHIO RECTAL ABSCESS.
25	M. H.	3/12/17	IMPROVED	1.5	4.4	1.52	0.096	---	---	2.1	ENLARGEMENT OF PROSTATE.

★ --- SMALL AMOUNT
++ --- MODERATE AMOUNT
+++ --- LARGE AMOUNT

Table 4.

blood chemistry showed the true condition of the patient, where clinical signs and urinary examination did not. Phenolsulphonephthalein elimination also improved in this case, although the patient became worse.

A survey of the complete figures of other cases here, shows that there were a number of instances, particularly in prostatic cases, where the blood chemical findings were normal, and the phenolsulphonephthalein elimination very much decreased. In these cases the phenolsulphonephthalein output was disregarded in surveying operative risk, the patient was operated, relying in each case on the blood chemical findings, convalescence was in no manner unusual

or disturbed by any thought of kidney insufficiency, such as was indicated by the diminished phenolsulphonephthalein output.

We have records here showing extensive changes in kidneys without urinary change, without change in the phenolsulphonephthalein output, and yet with very definite retention of urea, uric acid, and creatinine. We have other data showing that in the presence of a rather low phenolsulphonephthalein output, kidney function may be unimpaired, so far as retention of the nonprotein nitrogenous constituents is concerned.

The points which we wish to emphasize from our investigations with blood chemical methods as bearing specially upon surgery, do not vary much from the conclusions that interest the internists, namely, that the estimation of kidney function, after all, is a matter of computation of a number of factors, and that the phenolsulphonephthalein test occupies a subordinate position, even when positive, and then it is of much more importance than when negative.

In other words, as recently pointed out by Beer, "Good excretion of test substances usually means good function. Occasionally hyperfunction, however, may accompany severe diseases and may be very misleading." Foster called attention to the high figures of phenolsulphonephthalein output in persons dying with uremia. Unfortunately, the investigators who have worked with these various methods, have failed to make sufficiently searching researches upon all the important blood constituents which we are embracing in our present work.

We have some cases with mechanical obstruction to the outflow of urine, candidates for operation, with practically normal concentrations of uric acid, urea nitrogen, creatinine, and sugar, and yet with very low phenolsulphonephthalein outputs. These cases according to our view in no way were in a state of disordered kidney function. We have one record of a case of marked stricture with no discoverable physical signs of kidney change, which showed high concentration of these ingredients, including creatinine, figures pointing to an impending uremia, even though the clinical condition of the patient at the time of the first blood test, was extremely good. Later on, true to the prediction of the blood findings, this patient lapsed into uremia and dissolution occurred.

The blood chemical analysis tells us what the blood is storing up, what the kidneys are doing and what they are *not* doing, and also the exact status of nitrogenous and carbohydrate equilibrium.

We must insist in emphatically denying that the estimation of the presence and percentage of albumin in urine, and even the findings of casts indicate the condition of the kidney function. Kidney disease and kidney function are not synonymous by any means.

From our experience in this work we believe these new tests to be a valuable addition to our laboratory methods.

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GROUP DIAGNOSIS FOR THE CLINIC PATIENT.

By ROBERT POLLOCK, M. D., San Diego, Cal.

The matter of diagnosis has long distinguished scientific medicine from the various pseudoscientific cults with which it has been forced to compete. This distinction exists at the present time.

Accuracy in determining the condition of the patient has appealed to the foremost clinicians of many generations. This is meant to include not only an exact knowledge of the invading pathologic process or the perversion of normal physiology, but, as well, a knowledge of the powers of the individual to withstand attacks upon his health.

Advance in this latter direction still leaves much to be desired relative to such subjects as immunity and resistance. Wherever we have found especial pride taken in diagnosis there were found clinicians discussing the obscure and intricate with their fellows. Later, men began to separate themselves from their colleagues by specializing in consulting medicine, that is, aiding others in making their diagnoses and helping them in outlining treatment. As specialism further developed and the laboratory aids to diagnosis, including radiography and biochemistry, multiplied, it became apparent that no one man could boast of superior knowledge in all the specialties. Then came in the practice of passing the patient about to various consultants for special points of diagnosis. In this way the trained physician could multiply his own knowledge by assembling the data obtained from others, and give his patient a more comprehensive treatment. He asked for special advice where he felt something existed that had a bearing on the condition of the patient, the nature of which he could not determine. Many times the information he received was of negative character, sometimes of negative value. What he was unable to see was that many times he did not make inquiry in the right quarter. This led to the experiment of the diagnostic group clinic.

This is based on the belief that valuable diagnostic evidence comes sometimes from unexpected sources; that the surest way to get a comprehensive picture of the patient's condition, its causes and its needs, lies in making a complete survey of his entire system by clinicians competent to pass upon special fields, and then reaching a composite diagnosis after actual discussion by the examiners in consultation assembled. In this way it was felt that little would be overlooked, and that the recognized enthusiasm of specialists would be balanced by that of their fellows; so that in the process

of thrashing out the data under discussion the contained grains of truth would be separated from the chaff of insignificance.

The profession of San Diego has been fortunate in finding an altruistic citizen, willing to meet such necessary deficits as might accompany the attempt to institute a clinic along these lines. Mr. E. W. Scripps, a newspaper man of nation-wide recognition, has inaugurated, in memory of a beloved son, a movement in the interest of the man of small salary, the man with an income of \$100 a month or less. To these classes he plans to supply adequate medical service, including diagnosis and hospital care, at a cost within their means.

The initial step in the movement was the opening early in 1917 of the diagnostic group clinic. This is housed in a remodeled residence centrally located, and has been equipped with every facility for making complete diagnoses. The x-ray work and some of the laboratory work is for the present done at the offices of the men in charge of these departments. All other diagnostic work is done in the clinic building.

Each patient on admission pays a fee ranging from \$10 to \$25, in accordance with his monthly income. This fee covers his entire expense until a diagnosis has been completed. He is examined in turn by each of the specialists constituting the group, who record in writing their findings. These data furnish the material for daily noon-hour discussions, participated in by the various members of the group, and to which the physician referring the case is always invited. Patients in all cases must be referred by a physician, whose interests are carefully safeguarded by the clinic and to whom the patient is returned when the examinations are completed, along with a full outline of the diagnosis reached and the treatment indicated. A careful follow-up system endeavors to trace the cases to their final outcome, for statistical purposes.

After six months' trial of this system of diagnosis, the specialists in service are strongly impressed by the following features of the clinic:

It is comprehensive and leaves little to the imagination.

It brings to light many points of value that with ordinary physical study might readily be overlooked.

The discussion furnishes valuable graduate work to the staff members.

It enables the referring physician to secure a complete diagnosis without the risk of having the patient diverted elsewhere.

It serves those social classes that ordinarily get but indifferent service.

It has a tendency to raise the standard of diagnosis in the community.

In conclusion we must admit that the cost of diagnosis in the San Diego experiment is much in excess of the fee charged for it, so that a deficit for its initial year is destined to confront the trustees. Ideals in medicine are frequently far from being financial successes.

THE MANAGEMENT OF PREGNANCY COMPLICATED BY SEVERE CARDIAC LESIONS.

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The complication of heart disease in pregnancy is probably much more frequent than is commonly assumed. Fellner, who studied the histories of 30,000 cases in the Schauta clinic in Vienna, came to the conclusion that only one-seventh of all cardiac cases are detected, while the other six-sevenths pass unnoticed and untroubled through pregnancy and parturition. Other observers concurred with these views; and more recently Jaschke, who had exceptionally good opportunities for studying the question, likewise subscribed to Fellner's opinion.

The one-seventh, that is to say, those patients with cardiac lesions of whom we have direct and positive knowledge will bear watching, and require, in some instances, the judicious use of digitalis and an appropriate physical and mental hygiene, but the majority, too, will go through pregnancy and labor without difficulty.

The tables, however, are turned and the physician is faced by a difficult problem of great responsibility and grave concern if the patient's heart lesion is or becomes decompensated. The number of such patients is not large, but they live ever in the shadow of death. It is the consensus of opinion that mitral stenosis and myocarditis are most to be feared, but on the whole it is more the degree of decompensation than the particular kind of heart lesion which dominates the question. There is here urgent need for an intimate and harmonious cooperation between obstetrician and internist. It would best serve the interests of all concerned if they would attend the patient conjointly and see her at frequent intervals, for changes in the condition which call for quick decision and action, may occur quite unexpectedly.

This fact was impressed upon me anew only a week or two ago when a young woman of 26 was carried into the hospital, deeply cyanotic, gasping for air, and with a pulse hardly perceptible. She seemed unconscious at first, but after several injections of stimulants she could whisper a few broken sentences to the effect that, during the five months of her pregnancy, she had been fairly well except for a swelling of the legs and some dyspnea. Early that morning abdominal cramps had set in and her condition had suddenly become so alarming that an ambulance had to be called. I saw the patient less than thirty minutes after her admission to the ward, and after hurriedly ascertaining an enormous dilatation of the heart and the regular occurrence of strong uterine contractions, I hastened to the operating room to prepare for

immediate vaginal cesarean section. Yet, the instruments had barely been put into the sterilizer when the patient expired.

Fortunately, such fulminant cases are not overly frequent. Usually there will be time to make at least an attempt to relieve the decompensation and to tide the patient over until the fetus is viable. But if the patient does not respond promptly to medicinal, hygienic, and dietetic measures, further delay would be a great mistake. The therapy that is now strictly indicated, is the immediate termination of pregnancy. How to accomplish this depends upon the stage of gestation at which the decompensation of the heart becomes unmanageable. In the first three months of pregnancy the natural mode will be the instrumental dilatation of the cervix sufficient to admit one finger and to evacuate the uterus with finger and curet. There are cases, however, where sufficient dilatation cannot be accomplished without tearing deeply into the cervical tissue.

A case in question is that of a woman of 28 whom I saw quite recently with Dr. J. L. Swarts and Dr. E. P. Elmer. The patient had had her first child two years ago and, while there was no pronounced disturbance during her first pregnancy, one might discover, in retrospect, signs of a slight embarrassment of the heart at that time. At any rate, she never recovered complete health and strength, and when she suffered an attack of diphtheria about a year ago, symptoms of cardiac weakness made their appearance which now, in her second pregnancy, became greatly aggravated. The two internists mentioned diagnosed mitral stenosis and insufficiency which despite appropriate treatment became decompensated upon slight exertions. The pregnancy had progressed only to the seventh week, and the danger signals of broken compensation so early in pregnancy became, therefore, doubly alarming. Under these circumstances emptying the uterus was agreed upon. The cervix did not yield sufficiently to the steel dilators, until a deep lateral tear was made inadvertently. It was then an easy matter to loosen the ovum with the finger and to remove the ovisac and decidua with placental forceps and curet.

To prevent future conceptions, the patient is to be sterilized by vaginal resection of the tubes within a few weeks. At that time the cervical tear will be repaired.

Convalescence from the interruption of pregnancy was undisturbed, and the good effect upon the heart became quite obvious within 3 days after the operation.

In future, however, I shall not try again to dilate a rigid cervix forcibly, but shall, in a similar case, resort to those other modes of therapeutic abortion which have primarily been designed for use in cases where pregnancy has progressed a little further. I refer to the bougie method and to vaginal hysterotomy ("vaginal cesarean section").

The introduction of a bougie with or without tamponade of the cervical canal and vagina has the great advantage of simplicity. Its signal disadvantage is the length of time required until the cervix is sufficiently wide for spontaneous or artificial evacuation

of the uterus. We must remember that we have to deal with patients whose hearts have already proved unequal to the strain of ordinary pregnancy, and to whom the pain and blood pressure changes of uterine contractions may become fatal.

Vaginal hysterotomy, on the other hand, is an operation which can be completed in from 25 to 35 minutes, and which reduces, in skilled hands, the weakening loss of blood to a minimum. Accidental traumatism can well be avoided and postoperative morbidity is marked by its absence.

An essential part of the operation is the narcosis. It is strange how little attention this all-important subject has received in most of the discussions on our problem. In the class of cases here considered any inhalation narcosis is absolutely contraindicated. To give ether, chloroform, or nitrous oxide to such a patient who is fighting for air, whose heart is anxiously and impotently beating against the pressure of poorly oxygenated blood, means to strangle her in order to relieve her. Fortunately we have at our disposal two methods of analgesia which will not harm the heart of the patient: scopolamine—morphine narcosis ("twilight sleep") and spinal anesthesia.

It may be argued that both the technic of vaginal cesarean section and the administration of either of these methods of analgesia require special skill and experience. Yet, the condition is of such gravity as to make the practitioner desirous of securing the services of an expert.

The principles of the management of such a case may well be illustrated by a concrete example.¹

Mrs. J., 24 years old, has been a sufferer from heart disease for the last ten years. Of her three previous pregnancies, the first two terminated spontaneously at seven and six months, respectively; the third was interrupted at five and a half months because of grave symptoms of acute cardiac decompensation. She was now in the twentieth week of her fourth pregnancy. In the last two or three months her cardiac symptoms had become greatly aggravated. Galloping and arrhythmic palpitations, excessive dyspnea, and a racking cough forced her to sit upright in bed, disturbed her sleep, and so interfered with her nutrition that she had lost more than thirty pounds of late. The visiting internist, Dr. Fred Fahlen, made a diagnosis of cardiac dilatation with mitral and aortic insufficiency, and, after trying in vain for two weeks to restore compensation, he referred the patient to me with the request to interrupt pregnancy on vital indication. This indication was further confirmed in one of the regular conferences of the obstetrical staff by all the members present. In the selection of the best method I was guided by the experience of the patient at her last pregnancy in another hospital, where the abortion had been brought about by bougie and vaginal tamponade. Contractions had started promptly and expulsion of the fetus had occurred after eight hours, but the convalescence had been quite stormy and had lasted seven weeks. Under these circumstances, vaginal cesarean section in spinal anesthesia seemed far preferable, as involving the least possible risk. The opera-

¹This case will be reported in detail by Dr. Henry Meyers elsewhere in this issue.

tion was performed in the usual manner; it was rapid and practically bloodless and well borne by the patient. Her convalescence was extremely satisfactory. The action of the heart became more nearly normal almost immediately, and within four days the patient differed in no wise from other normal convalescents. She left her bed on the eleventh day and the hospital in twenty-one days after the operation with her heart fully compensated and her general health restored.

After the eighth month the consideration of the viable fetus introduces a new factor into our choice of treatment. Three methods now come into competition: the bougie and tamponade method, the introduction of hydrostatic bags, and the abdominal cesarean section. The former two may be employed in multiparous women with only slight degrees of decompensation, while in severe forms of the latter and in primiparis they seem to me greatly inferior to abdominal section. Not only the long duration of labor, but even more so the sudden changes in the pressure conditions during the second stage constitute grave dangers to the exhausted heart. Such rapid changes seem to be lessened in cesarean section, *provided it be done in spinal anesthesia*. Anybody who has laparotomized cardiopathic patients in spinal anesthesia knows how well the heart stands the operation.

Furthermore, the period immediately after delivery must be considered. It is almost impossible to estimate to a nicety how long it will take for bougies or bags to start effectual contractions. Pituitrin in small doses which is of such great help ordinarily in supplementing the action of these appliances, is out of the question in patients who are desperately ill. There is nothing to do, then, but to wait until the cervix is sufficiently dilated. Who can tell whether in a long drawn out labor the feeble reserve strength of the heart will not be completely dissipated, so that death will occur a day or two after confinement? Conversely, abdominal cesarean section offers itself as the quickest and most efficient mode of delivery in which the patient's power of resistance is economized.

For this procedure, too, a concrete instance may be adduced.

Mrs. C., referred by Dr. Walter Fischel, 30 years of age, and a primigravida of 6 months, has been on the ragged edge of decompensation for several weeks past. Her mitral stenosis, associated with considerable myocardial changes, has made her very uncomfortable. Bleeding from gums and nose has occurred easily and frequently. Dyspnea and attacks of weakness and dizziness have barely been held in check by appropriate treatment. The exertion of a street car ride on the occasion of her infrequent visits to the office left her prostrated.

We agreed on consultation that a strict anticardiac regime should be continued, if possible, to about the end of pregnancy, and that then abdominal cesarean section should be done.

Any other mode of delivery could hardly be considered in this case, as the patient had a generally contracted pelvis (Sp. $23\frac{1}{2}$; Cr. 26; Tr. 29; D. e. $18\frac{1}{2}$) which would have still further complicated a delivery *per vias naturales*.

Moreover, sterilization of the patient was urgently demanded and was to be done simultaneously with the delivery.

The attempt was successful. The patient reached the ninth month laboriously, to be sure, but fairly satisfactorily, and cesarean section was performed 3 weeks prior to full term. A living child, weighing 6 lbs. 4 ounces was extracted through a high incision, and after closing the uterine wound, the tubes were resected at each horn.

The operation was started in spinal anesthesia, but, unfortunately, the novocain on hand was rather old and had become inert, so that a small quantity of ether, not exceeding 50 c.c., had to be given. I am constrained to ascribe largely to the ether the fact that for two days after the section the pulse remained alarmingly high and feeble, and that the patient was prostrated for three or four more days, but after that she rallied, nursed her babe, left the hospital three weeks after operation, and presented herself in good health seven weeks after delivery.

If decompensation occurs at labor, the general principle again must be to finish delivery as quickly as possible. According to the stage of labor, the condition of the cervix, and the position of the presenting part, the intervention will vary between forceps and version with extraction. Only in rigid cervices with intact or but recently ruptured membranes will abdominal cesarean section be necessary. It may be permissible to warn against too hasty delivery of the child. One may act quickly and yet not lose sight of the principles of obstetrical safety. To pull out a child through an imperfectly dilated cervix or vulva means to produce traumas, the repair of which may be much harder on the patient than a few more minutes consumed in the natural preparation of the soft parts. Moreover, excessive speed in instrumental delivery creates a correspondingly quick drop in the intraabdominal pressure, a condition which must be minimized in any patient with cardiac lesions, and may best be guarded against by tightly bandaging the abdomen and applying a sand bag.

While in the foregoing, the discussion has centered about the method of delivery, the medicinal, hygienic, and dietetic care of this class of patients must never be neglected before, during, and after the termination of pregnancy. It is quite wrong to assume that the interruption of pregnancy is all that is needed. All advances that internal medicine has made in the treatment of heart diseases, will serve us in good stead. The attending physician will also appreciate the importance of keeping away from his patient any source of discomfort and annoyance, physical or mental. Lactation, as a general rule, is much to be desired. It may be well to feed the child artificially for a few days until the patient has fully recovered, but, after that, nursing the baby will only contribute to the mother's happiness. The lying-in period should be longer than usual and rising from the bed should not be permitted

until the heart has been prepared properly by mild methodical exercises such as I have described elsewhere.²

This paper would be incomplete did it not touch upon the question of prevention. Where the history of a given case tells us that a heart lesion has been made much worse by a previous pregnancy or labor, or where we have personally observed loss of compensation during gestation, it is incumbent upon us to prevent further conception by operative sterilization. The ordinary practices of prevention of conception, in particular interrupted coition, are inadvisable. In such cases, which after all are not very numerous, consultation should precede the operation, which should be performed in spinal anesthesia and consist of a partial resection of the Fallopian tubes.

SUMMARY.

If we regard the entire field once more from a bird's-eye view, as it were, we recognize that only a comparatively small percentage of women with cardiac lesions, who are pregnant, suffer a decided deterioration of their condition. But such patients may become critically ill from loss of compensation and require the most attentive care of their medical advisors. The individual physician hardly has the opportunity to acquire extensive personal experience with this class of cases, but, when he turns for guidance to his obstetrical text books, the advice he finds is all too meagre for practical purposes. What he needs is not only general principles but specific instructions. Yet, practically all our recent American text books on obstetrics omit mentioning the cardinal value of vaginal and abdominal section, and none of them acknowledge the paramount importance of avoiding narcosis, and the particular value of spinal anesthesia.

I have tried to supply, in the above, detailed rules for obstetrical conduct in the various categories of cases we may encounter. The dominant idea is this, that we are discussing only those cases of pregnancy in which the heart lesion has become unmanageable, and when it becomes necessary to interrupt pregnancy the guiding principle is to act with rapidity and decision.

²The Physical Culture of the Puerperium, *Interstate Medical Journal*, 1909, XVI, p. 33; The Management of the Puerperium—A Chapter in Preventive Medicine, *Lancet-Clinic*, 1914, CXI, p. 722.

A CASE OF PREGNANCY COMPLICATED BY UNCOMPENSATED HEART DISEASE.*

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Mrs. C. J., 24 years old, was admitted to the City Hospital December 26, 1916, and was assigned to the medical service because of severe dyspnea, palpitations of the heart, and constant cough. At the age of 14, she had diphtheria; since that time she has been troubled with her heart. Following an attack of tonsillitis one and a half years ago, she suffered from rheumatism which involved various joints. During this time her cardiac condition became greatly aggravated, to such an extent as to necessitate her going to the City Hospital for treatment. She has always been of delicate health, and, in addition to the usual diseases of childhood, she acquired typhoid fever two years ago, which left her eyes in a weakened condition.

Her menstrual history was fairly normal. Married at the age of 19 years, she has been pregnant three times. Of these three pregnancies the first two terminated prematurely at seven and at six months, respectively, while the third was interrupted at five and a half months because of grave symptoms of acute cardiac decompensation. She was now pregnant for the fourth time, her pregnancy having reached the age of twenty weeks.

Her cardiac symptoms, always troublesome, had become greatly intensified within the last two or three months. Galloping palpitations of the heart, extreme shortness of breath, and a distressing cough had made it impossible for her to lie down, prevented her from sleeping, and so interfered with her nutrition that she had lost more than thirty pounds of late.

Upon examination we found a poorly nourished woman of less than normal height, sitting upright in bed and breathing laboriously. Her face was pale and pinched, which contrasted strongly with the bulging eyes of which two-thirds of the sclera were visible. There were, however, no other signs pointing to exophthalmic goiter, in particular she had no enlargement of the thyroid and no tremor. The lungs were normal, except for a few moist inspiratory rales. The extremities were cold and edematous. The interest centered on the cardiac findings. The entire heart was found greatly enlarged; on the right side it blended with the liver dullness, while on the left side the apex reached the anterior axillary

*From the Obstetrical Service of Washington University at the City Hospital.

line in the sixth interspace. The impulse at the apex was diffuse, weak, and wave-like. The frequency of the heart beat was 128, with some arrhythmia. On auscultation there was a loud systolic murmur at the mitral area and a diastolic murmur over the aortic. No presystolic murmurs were heard. From these findings the diagnosis of cardiac dilatation with mitral and aortic insufficiency was evident.

Appropriate treatment was at once instituted and consisted of rest in bed, ice bags, digitalis, and morphine; but in spite of this, the signs of decompensation did not abate in the following two weeks. In view of the failure of our therapy, the visiting physician, Dr. Fred Fahlen, considered it highly inadvisable to subject the heart of the patient to the continued strain produced by the co-existing pregnancy, and maintained that the exertion of labor at full term would be extremely hazardous, if not fatal to the patient. Consultation was, therefore, requested with the Visiting Obstetrician on service, Dr. George Gellhorn, for the purpose of interrupting the pregnancy. At this consultation the following points were considered:

1. The valvular lesion had not responded to the usual treatment.
2. The condition was not caused by syphilis, as was proved by the outcome of the Wassermann test, taken both during her present and previous stay at the hospital; therefore antiluetic treatment would be of no avail.
3. Actual experience had shown that her cardiac condition had become aggravated in her three preceding pregnancies and had led to spontaneous abortions in two of them, while in the third the therapeutic interruption had become imperative.

Therefore the necessity for interrupting the present pregnancy was patent, as well as the fact that further delay would necessarily jeopardize the patient's life.

The next question was: How should this pregnancy be terminated? At her last pregnancy in another hospital in the city a bougie had been inserted and the vagina packed with gauze; this had promptly started contractions and caused expulsion of the fetus after eight hours. But this method of interruption had been too great a strain on the heart of the patient; she almost lost her life, and needed seventeen weeks before she was able to leave the hospital.

Another less severe method was therefore demanded. Dr. Gellhorn selected vaginal cesarean section as the method which would involve the least possible strain on the patient. This operation was to be done under spinal anesthesia because any inhalation narcosis would render the risks of intervention prohibitive.

Under these conditions the operation was performed by Dr. Gellhorn in the following manner:

After a preliminary injection of one ampule of pituitrin, spinal anesthesia with 4 c.c. of a 5-percent solution of novocaine was induced. Patient was kept

in sitting posture for four minutes, then slowly laid back into reclining position, though not quite horizontal. The external genitals were disinfected with tincture of iodine; the vagina and cervix cleansed with bichloride solution. The anterior vaginal wall was split upward in midline, about half way to urethra. The septum vesico-vaginale was incised. The bladder was then pushed off the anterior surface of uterus, both in mid-line and laterally, and was held back by a retractor; the anterior cervical wall was cut through with straight scissors exactly in mid-line, beginning at the external os and extending a little beyond the internal os; to bring the upper part of the incision closer to the operator, volsella were applied to the sides of the cervical wound and traction made. The amniotic sac was now seen bulging in the upper end of wound. The patient was having uterine contractions as the result of pituitrin. The membranes were ruptured, the fetus was turned by podalic version and extracted. Fetus had been dead some time, as shown by the friability of tissues. After removal of fetus, the placenta followed with slight pressure on fundus; after ascertaining that uterus was empty, one ampule of ergot was given intramuscularly. All operative incisions sewed up in reverse order with No. 2 chromic catgut. The operation was practically bloodless, and particularly there was no loss of blood from the uterine cavity.

Her recovery from the operation was most gratifying in every respect, the postoperative course was afebrile throughout. The pulse rate dropped to below 100 immediately after the operation, arose to 120-124 only once on the second day and became bradycardic on the third day. The dyspnea disappeared equally promptly; she ceased coughing after the fourth day; sleeping and eating were normal. She left her bed eleven days after the operation with compensation practically restored, and the hospital in three weeks after the operation. At the day of discharge her heart had receded to practically the normal size, the apex being found in the fifth interspace just beyond the mid-clavicular line. She had gained in weight and strength, performed the duties of a day orderly in the hospital, and was able to undertake housework in her own home.

SUMMARY.

A patient with a serious valvular heart lesion suffers a marked aggravation of her condition during her pregnancy. Appropriate treatment carried out energetically for more than two weeks fails to relieve the symptoms of decompensation. Therefore interruption of pregnancy is decided upon; the method chosen is vaginal cesarean section in spinal anesthesia. The relief following the operation is instantaneous. The patient leaves her bed on the eleventh day and the hospital in twenty-one days following operation with her heart fully compensated and her general health restored.

I desire to thank Dr. Gellhorn for the privilege of reporting this case and for his help in the preparation of the paper.

INTERSTITIAL TUBERCULOSIS OF THE LUNGS.

By MARY E. LAPHAM, M. D., Highlands, N. C.

Theoretically it is possible that tuberculous processes develop primarily either upon the functional surfaces of the air passages or within the interstitial tissues of the lung. The localization determines the mode of development, the physical signs and clinical course of the type, which remains constant unless one leads to the other and mixed types result.

Parenchymatous tuberculosis develops when the invasion of the lung by tubercle bacilli takes place upon the functional surfaces of the air passages. It is characterized by inflammatory reactions, by hyperemia, hyperplasia, hypersecretion, and the accumulation of their products. Parenchymatous processes result in bronchitis and broncholobular pneumonias with the physical signs of dullness, exaggerated roughened breath sounds and wet rales, and the clinical signs of cough, expectoration, temperature, loss of appetite, weight and strength, sweats, etc.

Interstitial tuberculosis of the lung begins in the enlarged bronchial glands surrounding the hilum, and from them infiltrations radiate out into the lung and are seen on x-ray plates as thready shadows, chiefly following the main bronchi up through the paravertebral and parasternal regions to the apex. According to Jordan and many others, these peribronchitic infiltrations are the pathological basis of fibroid phthisis, just as bronchitis and broncholobular edemas are the pathological basis of parenchymatous tuberculosis. These peribronchitic infiltrations are said to be produced by the thickening of the bronchial walls by a sluggish extension of tuberculous processes, which are encapsulated as fast as laid down, so that there are no inflammatory reactions and no accumulations, but a gradual loss of functional tissues and shrinkage. Instead of hyperemia, hyperplasia and hypersecretion, sclerosis of the blood vessels occurs and the tissues are dry, the functional cells are choked off, and secretory activity abolished.

Lacking complications, the chief consequences of these peribronchial infiltrations are the pinching and the constriction of the smaller air passages whose walls are not sufficiently rigid to withstand their embrace, so that they become compressed and more or less stenosed. Partial stenosis is somewhat relieved when the chest wall is pulled out by the act of inspiration, so that the air enters more freely; in expiration the chest wall falls back, the stenosis returns, and the air cannot escape as easily as it entered, so that

there is a tendency towards the retention of air, or asthmatic conditions, which may lead to alveolar distention, or emphysema. When the stenosis of the smaller air passages becomes sufficiently complete, their terminal lobules collapse and become atelectatic.

Atelectasis, asthma, and emphysema may coexist indiscriminately, according to the varying degrees of stenosis of their air passages, but in all these conditions the air is prevented from passing with normal force and rapidity and the breath sounds are weakened or suppressed. The transmission of atmospheric pressure to the terminal lobuli is not sufficient to distend them promptly and evenly, but one group expands after another, in accordance with the degree of stenosis of their air passages, and thus interrupted or cog-wheel breathing results. Delayed escape of the air causes prolonged and often suppressed expiration. The atelectasis does not cause dullness because the air content of the larger passages is preserved or even increased, but it does cause tactile fremitus.

Because the force of the atmospheric pressure is not well transmitted to the terminal lobules, they are not well distended and form areas of sagging. Because the thickened walls of the bronchi lose their ability to stretch and follow the expansion of the chest, their terminal areas lag behind and expand more slowly than the others. Flat, sagging, lagging areas with little or no dullness are especially apt to be found in the first, second, and third interspaces in the parasternal regions. When the retained air causes alveolar distention, these flattened areas may be hyperresonant, and even a retracted fibroid chest may thus have its emphysematous alveoli, possibly juxtaposed with collapsed atelectatic ones. These emphysematous areas are hyperresonant, but there are no rales because there is anemia and the tissues are dry. The physical signs of interstitial tuberculosis of the lung are increased tactile fremitus, positive d'Espine, suppressed, irregular inspiration with prolonged expiration, little or no dullness, good percussion note, or even hyperresonance.

The clinical signs are apt to be vague and nonspecific. Like the analogous processes in the liver and kidneys which do not manifest themselves specifically at first, this wasting of the lung need not declare itself until loss of functional ability is sufficient to be felt. In the dry tissues there is not much disintegration and little liberation or absorption of toxins, so that tuberculous toxemia is not characteristic.

For some reason or other, possibly because the efficiency of the endocrine system is reduced, or because the vegetative nervous system suffers, and consequently all the organs innervated by it suffer, functional dyscrasias of all the systems are common. Very often these functional dyscrasias are treated as originating in the system and they are not recognized as secondary, symptomatic

manifestations of tuberculous processes. We never miss the water till the well runs dry, and when there is no impairment of health or the impairment masks the tuberculous etiology, the danger may not be discovered until very late. Again and again our patients tell us "I was perfectly well until a few weeks ago when the doctor told me I had tuberculosis."

Only a day or so ago a poor little woman came drifting in to us because she was not well and the doctor thought a change of climate would do her good. "Nothing much the matter, just a little run down," and the whole of the right lung solid with dullness and wet rales, a temperature of 102° and chills.

If a pneumonic parenchymatous condition can escape like this, is it any wonder that interstitial tuberculosis is overlooked? Cough, expectoration, temperature, sweats may play no part in the clinical picture of interstitial tuberculosis of the lung, any more than do dullness, roughened breath sounds, and wet rales.

We find somewhat the same contrast between parenchymatous and interstitial processes in the liver and kidneys. The hypertrophic liver and large white kidney are analogous with the pneumonic lung: all three are hyperplastic, inflammatory and conspicuous, both clinically and by physical signs. It is their nature to manifest themselves. The atrophic liver, the granular contracted kidney, and the fibroid lung are all wasting, shrinking conditions which do not tend to declare themselves specifically until considerable loss of functional ability occurs.

The diagnosis of one type of tuberculosis of the lung is not necessarily concerned with that of the other, unless erosions and perforations have converted the interstitial into the parenchymatous type. In its purity, interstitial tuberculosis may be recognized by the history of associated diseases or by functional dyscrasias often regarded as primary. This part of diagnosis is largely conjectural. We so often find these functional derangements in taking histories that they come to seem to be the consequences of tuberculous influences. They may be classified according to the systems manifesting them, and thus any functional derangement of any of the systems becomes included in the consequences of tuberculous processes. Fundamentally it is possible that the vegetative nervous system is responsible for these far-reaching consequences. A reduction of endocrine functional capacity would explain and account for the whole field of functional dyscrasias, and the connection between the vegetative nervous system and its distribution in the lung, and effects upon the sympathetic ganglia, need only to be mentioned to show the probability that it may underlie endocrine insufficiency.

Nothing is more typical of hidden tuberculous influences than menstrual irregularities, and we have only to remember that ovarian

secretions are dependent upon endocrine hormones to understand why menstruation has such an exaggerated influence upon the development of the child. The infant is born incomplete and, for its development, the secretions of the endocrine glands are needed in the right proportions. If the endocrine system does not function properly, the development of the child suffers. The anemia and chlorosis, the gastro-intestinal disorders, the rapid pulse rate, the low blood pressure, the distended abdomen, are all symptomatic of reduced functional force of the vegetative nervous system, and of lack of endocrine functions as a secondary consequence. The fall of blood pressure, the lack of vasomotor tone, and the sluggish circulation in the blood forming centers might account for the anemia and chlorosis; the stasis around the gastro-intestinal glands is said to be responsible for hypersecretion, hyperacidity, and all its consequences, including a typical picture of gastric ulcer and the gastric crises of tabes. The appendix comes in for its share and may be removed on account of abdominal distress: the relaxed circulation in the skin may be responsible for the overgrowth of lanugo, the clammy, moist skin, the tendency to sweating, the dilatation of the blood vessels in the feet, and chilblains, and the well known association of the exudative diathesis with its erythemas, eczemas, vasomotor edemas, etc.

It is tempting to go a little further, and infer that an insufficient force of the vegetative nervous system might be a diathesis like any other family trait and so be subject to transmission. Certain it is, that in a large majority of cases, sympathetic and vagus disturbances are the earliest and most conspicuous manifestations of occult tuberculosis. If the development of an infant does not proceed properly, the functions of the endocrine and vegetative nervous system should be carefully studied, and the secondary manifestations, which are purely symptomatic, should not be regarded as originating in the systems chiefly manifesting them.

Instead of trying this or that diet, or this and that drug, the indigestions of infancy should be studied as possible manifestations of unsuspected tuberculous processes, either in the lungs, or the bronchial glands.

In the nervous system, spasmophilia, chorea, and nervous instability are so often the forerunners of the discovery of tuberculosis that they are coming to be regarded as symptomatic.

The bulging eyeballs of children are not more conspicuous and convincing of sympathetic derangement by tuberculous processes than are the other functional manifestations when rightly understood.

The discovery or exclusion of tuberculous processes in infants and children depends on the history, the x-ray, tuberculin tests, and physical examination. The history is chiefly concerned with func-

tional derangements. If an infant is not well, it will do no harm to exclude tuberculosis; would it be advisable to exclude tuberculosis in a seemingly well infant? Would this seem far fetched, unreasonable and unnecessary? For the individual child it might or it might not be, for of late routine examinations of infants in the first months of life have revealed a surprising percentage of tuberculous processes, when there were no indications of their presence. For the sake of extending our knowledge of tuberculosis, of when it begins and how it develops, the study of the newly born and of infants during the first two years of life might be valuable.

Combé and Pollak have shown the frequency of unsuspected tuberculous processes in infants, processes which do not mean tuberculosis as a disease, for the babe continues to live without being clinically tuberculous, and it is possible that an adequate study of babies might teach us that these tuberculous processes, which are so hard to understand in adults, are equally characteristic of infancy.

Suppose we should learn that, in a certain percentage of infants, tuberculous processes were extending from the bronchial glands into the lungs along the peribronchial sheaths, how would this knowledge influence our conception of tuberculosis as a whole? It would give us some idea of the period of incubation, which is at present wholly unknown. We know that acute tuberculosis is a myth, for there must always have been a preceding period of preparatory development, and that the "acute" attack merely supervenes on a preexistent condition. The study of infants would give us more information concerning the period of latency and its relationship to future manifestations than could be acquired in any other way. This study would demand time enough to watch the babies grow to manhood and later life, but the tracing out of these developments would answer the question of the relationship of the tuberculosis of infants to that of adults.

Before we can know anything about the tuberculosis of adults and its logical prevention, we must know whether it is the delayed manifestation of the tuberculosis of childhood, because, until knowledge is obtained, we are travelling all day in a peck measure, and always coming back to the same place we started from, which is, the relief of manifest tuberculosis.

The logical way to prevent tuberculosis is to keep it from becoming manifest by discovering it in time, and, if we take care of our babies, it is possible that our men will take care of themselves.

Assuming that we are all agreed upon this, and that it is of fundamental importance for the parents to know whether the baby is developing tuberculous processes or not, how shall we decide this question if the baby is seemingly well? The sensitization to tubercle bacilli is probably best discovered by a Mantoux test, es-

pecially if a Moro is negative. If the x-ray shows enlarged glands at the hilum and the Mantoux is positive, this enlargement is possibly tuberculous. Insufficient breath sounds, with tactile fremitus through the paravertebral and parasternal regions, combined with good resonance, is a good combination of physical signs, suggesting tuberculous infiltrations along the bronchi, provided there are no other obstructions to breathing either in the nose or throat.

An examination of a sufficient number of healthy babies will probably lead the student into a swamp, where he will flounder utterly unable to rescue himself, for he will not know what to do with the data he accumulates nor how to unriddle its significance. If only one baby in a hundred presented the syndrome of tuberculous processes, he would find their detection interesting and reliable. When he finds the same combination in one well baby and in one well child after another, he becomes confused, says there is no meaning in it, and is inclined to throw the whole affair overboard. The extreme sameness of the findings, apparently deprives them of all value. When one healthy boy after another displays the same condition in the lungs what are we to think but that these findings are of no importance? We feel perfectly certain that the babe or child has not tuberculosis, no doubt.

But suppose that these findings are true enough, and that it is their significance which escapes us? Suppose we should eventually learn that a large percentage of babies and children do develop tuberculous processes in accordance with the well known percentage of positive tuberculin reactions, what would this teach us? Would it teach us that all these reactions were undoubtedly due to exposure to open cases of tuberculosis, or that there was some fundamental reason for this development which we do not yet understand? Would these findings have any relation with the well known fact that, with our increasing ability to detect early tuberculosis, we are finding tuberculous processes in adults that puzzle us by their abundance and by their compatibility with health and working capacity?

It is so often the case that we can make the diagnosis of tuberculous processes without any difficulty while we are not so certain as to the prognosis.

If the health and working capacity are good we do not say that the patient has tuberculosis. When there is no interference with working capacity, or when the amount of work is restricted simply by lack of strength, we often find in x-ray plates a good deal of peribronchitic infiltrations, and this frequency has led to distrust of x-ray findings. How often do we say, "Look at this plate, and see what a typical picture of tuberculosis it shows, and yet the man has never had a sign of it. What do your x-ray plates amount to?" They may amount to just as much as the histories of cases,

and the tuberculin tests, and the physical findings, and all these facts may some day be combined into a harmonious whole to show the astonishing frequency of tuberculous processes, which equals the frequency of their appearance at autopsies, and also to prove that tuberculous processes do not always mean tuberculosis.

We may also correlate these findings in adults with the same findings in infants and children, and thus be enabled to explore and describe the hidden, unknown world of concealed tuberculosis which is today lying all about us, and which we are making no efforts to comprehend. It is from this sea of concealed tuberculosis, surrounding us on all sides, that now and then a case rises to the surface like cream on milk and gets skimmed off. Then what an ado we make, and what a demand for milk, and eggs, and hospitals, and all the paraphernalia of palliation, as we grab up these manifest cases and hurry them off to sanatoriums, in order to protect the rest of us, and all the while it is all around us, and we wait patiently until further developments create more manifest cases which we can pick up and run off with. This is palliation and relief work and has its imperative demands for aid, but to ascribe preventive properties to palliation is childish.

What we need to do is to first comprehend the world of concealed cases, and then learn how to prevent them from becoming manifest. This is the real need in tuberculosis work demanding research and the keeping of records for a long enough term of years to obtain the requisite information.

If we are to protect our children and our wage earners from the insidious extensions of interstitial tuberculosis we must learn how to correlate established facts and prove their significance.

Before we can accurately comprehend the manifest cases of adults or of children, we must study the stages preceding these manifestations. We must begin at the beginning and not at the end as we are doing today.

If someone would establish a research fund for the study of the tuberculosis of babies and children the problem might be solved for the whole world and for all time of how best to prevent tuberculosis.

As it is, a higher comprehension looking on at our futile attempts to dip up the sea with a cup, and observing our lack of fundamental knowledge, might well be moved to say, "Lord, forgive them, for they know not what they do."

THE USE OF TARTAR EMETIC IN THE TREATMENT OF MALARIA—PRELIMINARY REPORT.*

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That quinine is not serving as a specific in all cases of malaria is attested by the fact of the growing literature on the use of other drugs in this infection, and by the common occurrence of having patients return for treatment after being discharged apparently cured. The probability of reinfection in these cases, of course, has always to be borne in mind. Galveston has always been peculiarly free from malarial infection arising on the island, but the number of cases, coming here for treatment from other parts of the state, which, after treatment and discharge, have returned for further treatment without ever having left the island, lends strength to the belief that quinine all too often fails to cure. It is especially in those cases of estivo-autumnal infection, the malignant tertian of the English, that quinine fails almost entirely.

Recently Rodgers¹ published a report of his experiences with tartar emetic used intravenously in the treatment of malignant tertian, or estivo-autumnal malaria. Previously he, with Hume,² had found this drug to be almost a specific in kala-azar and, because of the similarity of the two protozoal organisms, the Leishman-Donovan body in kala-azar and the plasmodium in malaria, its use in malaria was suggested. A 2 percent solution was used, starting with 4 c.g. making the initial dose 0.6 grain. After 2 to 3 days a second dose, which was twice as large as the first, was given; this was followed in two to three days, if necessary, with a third dose, twice as large as the second.

Rodgers' report is most encouraging, though only a few cases were treated. Low and Newham³ of the London School of Tropical Medicine, stimulated by the report of Rodgers, tried the tartar emetic intravenously in doses ranging from 1 grain to 2½ grains, in a case of estivo-autumnal malaria with numerous crescents in the peripheral blood. Their work was carefully done and, after several days' treatment, they found practically the same number of cres-

*From United States Public Health Service and the Pathological Laboratory of the John Sealy Hospital.

cents present in the peripheral circulation as before the treatment was started.

We undertook the use of tartar emetic intravenously with some trepidation, we will admit. All authorities we consulted stressed especially its depressant action on the heart if used too much as an emetic, even in doses of $1/6$ to $1/3$ of a grain, while the doses given for malaria were considerably larger than this. Rodgers reports no bad effects from its use, sometimes a rise of temperature of one to three degrees ensuing.

The following is a brief report of its use in three cases of chronic tertian malaria. Estivo-autumnal malaria is rarely seen here until the late summer and early fall, and we thought that a report of our experiences would probably encourage others to use this drug and so arrive quickly at some idea of its value.

CASE I.

A. F., seaman, aged 39, contracted malaria in Mexico three months ago; was given quinine by mouth and intravenously. Chills stopped and felt well. Stopped quinine for about one week and had another sharp chill with rise in temperature. Entered hospital March 3, 1917. Physical examination negative except that the spleen was much enlarged, being palpable three fingers' breadth below the costal margin. The morning of March 4, he had a hard chill, temperature going to 104° F. Blood smear showed many tertian organisms, as many present as there were white blood cells. Two c.c. of a 2 percent solution of tartar emetic was injected intravenously, following which there was no reaction. March 5, a blood examination showed only two cells in which suspicious looking organisms were present. March 6, 2 c.c. 2 percent solution tartar emetic given intravenously. Temperature went to 99° F. Spleen was reduced in size, only two fingers below costal margin. March 8, injected 2 c.c. 2 percent solution tartar emetic, no reaction. Examination of blood smear did not reveal any plasmodia. Spleen becoming smaller. March 14, patient stated he had a chill, though there was no rise in temperature. Blood examination showed plasmodium of tertian type present. March 16, patient had a sharp chill with rise in temperature to 103° F., severe headache. Spleen barely palpable at costal margin. Four c.c. 2 percent solution of tartar emetic given intravenously. Two doses of strychnine nitrate gr. $1/30$, were given hypodermatically, three hours apart, in order to guard against a possible depressant effect of the tartar emetic, as 2.4 grains were given in this dose. On the 18th there was another chill with a rise in temperature to 101.4° F. Tartar emetic was discontinued, and quinine and urea hydrochloride gr. 15, given daily intravenously for three days together with quinine hydrochloride by mouth gr. 10 t. i. d. Patient discharged March 22. Temperature normal, no plasmodia in peripheral circulation, spleen not palpable.

CASE II.

J. G., seaman, aged 30, entered hospital March 13, 1917, with parotitis and orchitis. Temperature like that of malaria. Had never had a regular paroxysm though daily rise of temperature had occurred. Physical examination negative, except for swollen glands affected. Blood examination March 15, revealed many plasmodia of tertian type. March 16, 4 c.c. 2 percent solution of tartar emetic given intravenously. No reaction. Temperature became normal and remained so. March 19, blood examination showed tertian parasites

still present. Was put on quinine and urea-hydrochloride. Discharged on March 21st.

CASE III.

N. M., seaman, aged 30. Tertian parasites in peripheral circulation. Entered hospital March 31, 1917, with temperature 102° F. following a chill. April 2, 2 c.c. 2 percent solution tartar emetic given intravenously. No reaction. Temperature became normal and remained so. April 5, 4 c.c. 2 percent solution of tartar emetic given. No reaction. April 8 4 c.c. 2 percent solution tartar emetic intravenously, no reaction, temperature continuously normal. April 11, blood examination showed tertian parasites present. Patient was given quinine hydrochloride gr. 10 t. i. d. by mouth and quinine and urea-hydrochloride gr. 15, intravenously once daily. April 17, blood examination showed no plasmodium. Discharged on April 18th.

In all of the above cases careful attention was paid to the pulse rate and blood pressure, frequent determinations of each being made for several hours before and after the giving of the drug. In no instance was any effect noted. Another feature of interest was the entire absence of subjective symptoms, even after such large doses as 4 c.c., amounting to 2.4 grains of tartar emetic. The patient in Case II stated he felt much improved and did not suffer from the dizziness, headache, ringing in the ears and slight nausea so frequently noted after intravenous use of quinine and urea-hydrochloride.

SUMMARY AND CONCLUSIONS.

In the few cases we have reported, it is seen that tartar emetic used intravenously in comparatively large doses has no ill effect upon the circulatory apparatus. In cases of tertian malaria it reduces the temperature and apparently relieves the patient, though not curing him, as plasmodia were present in the blood stream after rather large doses of the drug.

No conclusions can be drawn, but it seems that in tertian malaria at least, tartar emetic is not as efficient as quinine. Our only excuse for publishing so few reports was that by so doing it is hoped that further reports will be published. The effect of tartar emetic in estivo-autumnal malaria will be reported in a later paper—as soon as a sufficient number of cases have been collected.

For permission to report the above cases we wish to thank Dr. L. P. H. Bahrenburg, Surgeon in Charge U. S. P. H. S., in which service the cases were observed. Our thanks are also due Drs. Mebane, Lowry, and Mills, interns, for their interest in administering the drug and observing the cases.

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HEADACHES DUE TO EAR, NOSE, AND THROAT CONDITIONS.

By W. T. PATTON, M. D., Ph. C., F. A. C. S., New Orleans.

This subject is a very broad one, it would be impossible to cover the entire field in several symposiums. I will only attempt to mention and discuss some of the most common causes of the symptom "Headaches." I say symptom, because headache is no more a disease than rheumatism, and we should be severely criticized if we treated this condition without attempting to find the cause.

The causes of headache may be set out under the following heads:

1. Toxic (intestinal, appendix, gallbladder, prostate, tonsils, nasal cavities, teeth, kidneys, ears).

2. Reflex (from eyes, pressure in nose, uterus, irritated tooth).

I shall limit myself to the causes found in ear, nose and throat.

The most common and most often overlooked cause, according to my personal observation, is pressure in the nose, without any marked pathological condition.

CASE I.

Mrs. H., referred to me from Baton Rouge, suffering with very severe pain over entire right side of head, more severe in supraorbital region. Patient had been under physicians for past two weeks and only relief was obtained from morphine. *Examination of nose.*—Membranes look healthy, no abnormal secretion. Middle turbinate on right, tightly wedged between septum, which was slightly deviated in upper part to right, and outer wall of nose. It was impossible, even after tissues had been shrunk, to pass the smallest cotton applicator between septum and turbinate, or between turbinate and outer wall. Color of turbinate pale from pressure. *Treatment.*—Middle turbinectomy performed. At once patient was relieved, explaining she had the sensation of a spring being removed and pressure relieved. Patient has had no trouble since, now eight months.

I could cite any number of such cases, where either the middle turbinate or septum have been removed and patient cured.

CASE II.

Mr. G. D., age 44. Past history negative, about 12 years from time I first saw him, began having pain and throbbing over left side of head, at first periodical, increasing in frequency. Has been treated by number of physicians without much result. Eyes negative. Now pains are continuous and very severe. Has had to give up work. *Examination.*—Septum deviated to left, middle turbinate scarcely visible and seems tightly wedged, slight amount of mucus but no pus. *Treatment.*—Sub-mucous resection performed. Patient's condition improved rapidly. Now two years and no headaches. This is another case of pressure pain and possibly a secondary occlusion of sinuses.

Now just a few words in regard to sinuses. It is often hard to say just what sinuses are at fault, often all are involved.

CASE III.

The present patient has suffered with headaches 16 years and been to various clinics. Was sent to nose and throat clinic about two weeks ago. Slight amount of pus found under right middle turbinate and posteriorly. Right antrum washed out, great amount of pus found. Patient relieved for 24 hours. Three days later antrum again washed. Washing repeated every other day for ten days, pus and pain continued. Tuesday, January 30, inner wall of antrum removed. Patient now free from headache and pus very slight. In this patient the symptoms are due to absorption and possibly some reflex irritation of branches of fifth nerve.

Suppuration of the frontal sinus will often give no pain, as long as drainage is good; but the most violent pain is caused when we have a closed suppurating frontal sinusitis. Often simply removing obstruction and washing out or aerating the sinus will relieve condition.

Ethmoid sinusitis causes a number of obscure headaches, the pain is very variable, from a sense of fullness over bridge of nose, to severe pain over entire head. Another reason why headaches from these sinuses (ethmoids) is hard to diagnose, is that there often is no visible trouble. We may, by probing, find a polypoid condition and after excluding other sinuses, place the blame on the ethmoids. In polypoid sinusitis, there is often no pus and very little abnormal secretion.

Last, but not least, comes the sphenoid sinus. No doubt this sinus is the cause of a great many obscure pains in the head. Let us consider the anatomy of this sinus just a moment. The sphenoid sinuses are two irregular shaped cavities in back part of nose just posterior to the ethmoids, their openings are at the top and are very seldom visible. Posteriorly they are separated by very thin bone from the pituitary body, the cavernous sinus and the third, fourth, fifth, sixth, and vidian nerves. These nerves are often found running under the mucous membrane of the sinus, or only separated by a thin wall of bone. By injecting cocaine into this sinus, we can often get anesthesia of one or more of these nerves. Now if absorption of cocaine can take place into nerves, does it not stand to reason that a sinus full of pus or other morbid products might affect these same nerves?

Dr. Sluder, in a paper read before the American Medical Association, May 5, 1915, said: "I believe many (but not all) of the recurrent headaches that bear the name migraine are sphenoidal empyemata, that have lost most, if not all local signs or were started as such empyemata, and that the nerve trunks have become involved either by extension of the inflammation (or its toxin) through the thin wall separating the sphenoid sinus from the adjacent nerve

trunks. The treatment of these cases is removal of the anterior wall of sphenoid, and if badly diseased curetting gently and washing out with aqueous solution of sodium salicylate (2 to 5 percent) or 1 percent carbolic acid in oil.

Often the headaches spoken of as occipital are sphenoidal in origin.

CASE IV.

Mrs. H., age 45, suffers nearly continually with pain in occipital region, often very severe; duration two years, has been treated by gynecologist, oculist, general practitioners, osteopaths and even "Christian Science" with very little relief. *Examination.*—Nose, nothing abnormal noticed. Postnasally could see small amount of thick pus over posterior end of middle turbinate. *Treatment.*—Removed middle turbinate and curetted posterior ethmoids. Patient slightly relieved. Two weeks later opening of sphenoid found and sinus washed, much improved, later anterior wall removed. Patient now entirely relieved, only occasionally comes to have sinus irrigated.

CASE V.

Miss S. M., age 29. April 13-14, headache all time over eyes and back of head; tightly wedged middle turbinate removed from right side of nose; septum deviated considerably in upper part to right; no visible pus. May 11, has had very little pain in head past two weeks and feels much better. May 14, pain over right side head; pus coming from right frontal and ethmoid region; Wassermann negative. May 20, pain still severe; impossible to enter frontal on account deviated septum. May 24, suffering great deal; sent to Presbyterian Hospital; x-ray shows ethmoids on right very cloudy. May 27, submucous resection of septum, ethmoids scraped, sphenoid sinus opened; patient, as would be expected, had considerable pain. June 29, patient now free from pain and feels well; discharged. September 1, returns, complaining of severe pain in supraorbital region; nerve injected with alcohol; relieved two days. September 17, supraorbital injected again. October 26, patient has remained free from pain until last few days, now severe pain over first and second division of fifth nerve. November 2, supraorbital and second division of fifth nerve injected; only temporary relief. October 16, supraorbital nerve removed under local anesthesia and foramen plugged with wax. December 8, patient returns, suffering with pain in second and third divisions; injection attempted number of times by myself and later by Dr. Allen with only slight result. January 16, gasserian ganglion removed by Dr. Allen. January 23, discharge from right ear; slight facial paralysis. January 24, discharge from right ear; drum incised; facial paralysis marked; pain over mastoid. March 2, 1915, patient has very little pain, still some tenderness over mastoid. July 9, mastoid very tender; leukocyte count, 20,000; temperature, 102°; mastoidectomy performed with local anesthesia; small amount pus; considerable necrosis of mastoid. Since this operation patient has had periodical attacks of pain and tenderness over mastoid, sometimes over the course of facial nerve. Eye has caused a great deal of pain and patient has had to use dionin freely and olive oil.

Just how to account for this pain over the fifth nerve I am at a loss and hope to have some one explain. Is it a hysterical condition? Certainly after complete removal of ganglion there could not be regeneration of nerve connections.

CASE VI.

Mrs. C. F., aged 44, has had discharge from left ear as long as can remember, claiming for past ten years has suffered great deal with pains over left side of head, often very severe. Two months ago was suddenly attacked with violent vertigo and could not stand up. Nausea and severe vomiting. Was sent to Charity Hospital, admitted to medical service. I was called to examine ears. At this time patient had free discharge, from left ear, of pus, drum membrane bulging. Mastoid only slightly tender, strong nystagmus to right, could not sit up in bed. Tendency to fall to left. No labyrinthine tests were made, advised patient's transfer to otological service. I did not see case for week, then was called by one of the otologists in consultation. Patient not very ill, temperature 103°. Mastoidectomy performed next day, found very sclerotic bone, small antrum, middle ear full of cholesteatomatous material. Fistula in horizontal semicircular canal. Patient has made uneventful recovery, all dizziness and nystagmus have disappeared. Patient claims now has no headaches and feels in every way much improved.

This case is not reported in detail as to interesting labyrinth condition, but is given to illustrate headaches from chronic otitis.

We should always be on our lookout for trouble with teeth causing reflex pains in head. In touching on this part of the subject very lightly, I would caution all about relying too much upon appearances of tooth, the x-ray is only reliable way to rule out teeth.

In the throat the most common cause of headache is absorption from diseased tonsils, which space forbids discussing. Often we get reflex pains from the ears in chronic catarrhal otitis. The pains from acute otitis, mastoiditis, sinus thrombosis, brain abscess, and a number of other conditions about head and neck can only be mentioned.

My intention has been simply to call attention to some of most common causes of headache, and let those other than the specialist see that it is not always an easy matter to say whether the nose and throat are or are not the cause of trouble.

AVIATION AND OTOTOLOGY

By LOUIS K. GUGGENHEIM, of the Editorial Staff.

Among the many medical developments, resulting from the present war, is the tremendously important relation of neuro-otology to aviation. If it is true that the defeat of the enemy would be assured if we had a sufficient number of aeroplanes and aviators to manipulate them, then neuro-otology must today be counted among the most important branches of medicine, for, without neuro-otology, a high state of efficiency in the aviation service would be impossible. There is no doubt at all that hundreds of the fatalities among aviators have been directly due to an imperfect balance apparatus. In a recent article the writer described the neuro-otologic pathways and the Jones Bárány technic as employed in the examination of the kinetic-static labyrinth and the brain;¹ here he will deal with neuro-otology in its relation to aviation.

Our indefatigable Isaac H. Jones has been made a major in the signal corps and is in direct charge of the units, which he has created throughout the United States, for the examination of applicants for the aviation service. What a blessing this is to the thousands of patriotic but vestibularly defective young men! Since bird-men have been in existence, the number of deaths has been horrifying; and only in a certain number of instances could the fatality be attributed to any definite thing, such as defective engine, defective frame, etc.; in many cases the accident remained inexplicable. Those who are working with the vestibular apparatus, now feel that the unexplained fatalities were probably due to some abnormality of the aviator's own balance apparatus.

Balance depends normally upon (1) the vestibular apparatus, the most important part of which is represented by the kinetic-static labyrinth; (2) the visual apparatus; and (3) kinesthetic or muscle sense. It is astonishing how beautifully we manage to get along, under ordinary circumstances, when in possession of but two of these three legs. The blind man can walk with fair ease. The loss of muscle-sense in certain neuropathic conditions does not make it impossible for the individual to go about; the balance apparatus of the internal ears may be completely destroyed without the individual even knowing it.

Now, when any state exists in which more than one "leg" of the balance tripod is thrown out of commission, even temporarily, trouble appears. If the blind man's vestibular apparatus is de-

¹Guggenheim—*Neurotology* (*Interstate Medical Journal*, Jan., 1917, pp. 54-69).

stroyed, and he becomes dependent upon muscle sense alone for his balance, he finds himself most unsteady. Likewise, when an individual whose kinetic-static labyrinth has been destroyed, by the absorption of some toxin for example, suddenly loses his power of vision, he finds his muscle-sense alone very inadequate.

So we see that when an individual enters a field in which he may at any moment be robbed of one or more of his balance "legs," we must be certain that he has intact the most important "leg," namely the vestibular apparatus.

"When an aviator ascends into the clouds his eye-sight is no longer of any service, as far as balancing is concerned; as soon as he leaves the earth his muscle sense is of little help, so we must be absolutely certain that every man who enters the aviation service has a perfect vestibular apparatus."

Because of the tremendous importance of the aural balance apparatus in aviation the war department has placed neuro-otologists in complete control of the examining boards. If the tests show a perfect vestibular apparatus and the remaining physical examination is satisfactory the applicant is accepted. If the tests show a defective vestibular apparatus the applicant is "out."

Because of the thousands of applicants who must be examined within a very short time the Bárány-Jones technic is somewhat altered to suit conditions. Douching the ears is not ordinarily resorted to. The applicant is observed for spontaneous nystagmus and spontaneous deviation of the arms, etc. The hearing is tested. He is then turned to the right with the head 30° forward, ten times in twenty seconds, in a Bárány-Jones chair, and must show on being stopped a horizontal nystagmus to the left for 26 seconds, or within the physiologic limits of deviation. He is then turned to the left, and must show the same type of nystagmus to the right for an equal length of time. He is then turned to the right, with head 30° forward, ten times in ten seconds; upon stopping, past-pointing to the right must occur with both arms three times, or within the physiologic limits of deviation. He is then turned to the left and past-pointing to the left for the same number of times must occur. He is then turned to the right five times with head 120° forward. Upon stopping and sitting up, he must fall to the right. After turning to the left, falling must occur to the left.

Human psychology is here as interesting as ever. Patriotic young men handle truth in a reckless manner in their efforts to "make good" at the examination. When asked about seasickness, many of them emphatically deny ever having suffered an attack; feeling that any admission to the contrary would show a 'fatal' weakness. They little know that never having been seasick, under conditions favorable for the production of that state, is highly suggestive of defective labyrinths; seasickness having been proven by Bárány, to be

a direct result of the unusual movement of endolymph in normal labyrinths. Applicants also try to compensate for the normal past-pointing by pulling the arm to the right or left of where they believe the finger to be; not knowing that the absence of past-pointing after turning is a serious thing, and means that they are "out."

This interference with the test results from word being passed from man to man, concerning what is going to happen at the examination. Nausea and vomiting resulting from irritation of the tenth nucleus is also perfectly physiologic if the turning is carried on too long; many of the applicants are ashamed of such a weakness and loudly disclaim their ability to feel any such thing as nausea until——!

The examiners know all these little things and explain, to any applicant who tries to "start something," that it pays to be just natural and follow the impulse of the moment. For the benefit of those unacquainted with the subject it may be of advantage to add a word of explanation concerning the physiology of the Bárány tests. When the kinetic-static labyrinth is stimulated, either by turning the individual or douching the ear, two phenomena are manifested, nystagmus and vertigo. Nystagmus results from stimuli passing from the vestibular end-organ to the neuraxis and in the neuraxis through the fasciculus longitudinalis posterior to the eye muscle-nuclei; vertigo is perceived in the cerebral cortex and results from stimuli passing through the neuraxis to the cerebellum, and thence to the cerebrum. Directly and compensatorily we have past-pointing (including falling), resulting from the vertigo. The subject, feeling that he is turning in a certain direction, reaches back to find the finger: because he is not actually turning, his effort results in pointing past the out-stretched finger of the examiner. When the vertical canals are stimulated in the frontal plane (head 120° forward) the subject, upon sitting up, feels that he is falling in the direction opposite to the actual turning, and really falls in the direction of turning in his effort to compensate.

CONTAGIOUSNESS VERSUS COMMUNICABILITY.

By D. M. LEWIS, M. D., New Haven, Conn.

Our past and present inability to control communicable diseases resides very exactly in the absence of understanding of the word contagious. Brought home to me at the recent meeting of the American Medical Association in June this year, I believe that the subject is most timely.

At the meeting mentioned, the neurological committee of the New York Academy of Medicine reported that poliomyelitis was not "contagious." After the strenuous objection especially by board of health experts, that the disease was not only communicable but certainly somewhat contagious, the said committee agreed that the disease might be communicable.

Is there a difference of meaning between these words? If so, what is it? If not, why should modern public health replace the word contagious by communicable and speak of differences?

Definition of the word contagious should be made in terms of the so-called "old" public health. The definition of contagion was as follows: The carrying of certain diseases to a third party who had had no contact with one ill of the disease, by one who had had such contact or by other animate or inanimate mediate contact. The word fomites was used, in an analogous manner, for objects supposed capable of absorbing and conveying contagion.

Based on such a conception, preventive work concerned the immediate surroundings of the one ill, and of all contacts of the one ill.

It is pertinent to the discussion to review briefly such preventive measures, as they are yet the basis of our codes. Should the case be isolated in a bare room, should the attendant wear protective cap and gown, should no articles within the room have access to the outside until rendered aseptic, should the patient and attendant, on recovery, have a disinfectant body- and hair-bath, then be clothed with garments from the outside and the room including the furnishings fumigated, according to the views then prevalent, there would be carried out all the essentials for preventing further cases. If the case died, a hermetically sealed coffin and private funeral were as essential. Secondary cases were attributed to the exposure of others to the one ill, or to infractions of the orders of quarantine. Return cases were accounted for by similar infractions of measures for the release of the recovered case.

There then ensued an era when it was expected that hospitalization would fulfil all the conditions and that missed cases only would keep up the sporadic cases. One point especially notable was the guaranteed immunity in the contagious diseases, generally, with the future freedom, from quarantine, of the individual at all times when he could show that he had had the disease. Diphtheria alone was an exception.

With the demonstration of carriers of diseases, fomites as a word of refuge became untenable. What measures of prevention based on this word, almost synonymous with contagion, were anywhere dropped other than "terminal fumigation?" The inability to control contagious diseases previously was now explained by the existence of numerous well individuals who as carriers, in conjunction with missed cases, continued to spread these diseases. Quarantine reasonably became effective only in smaller communities with the advent of the first case. With the demonstration that mosquitoes were the only carriers of yellow fever, fumigation of clothes was now rationalized. Similarly the demonstration of the louse as the carrier of typhus fever rationalized not only fumigation, but also the cap and gown of the attendant, when that cap and gown was so extended as to prevent that carrier reaching said attendant. Otherwise any body dead of either disease is yet so contagious as to require a sealed coffin and private funeral. Why not similar measures with the body of one dead of malaria?

Flies as well as contacts are carriers of typhoid fever. Is the dead body of a typhoid patient any less contagious to such carriers than typhus, from the insect point of view, or diphtheria from the standpoint of contact? Is it not an irony that a typhoid attendant can carry more typhoid germs under his finger nails to others not in contact with the one ill than a similar attendant in diphtheria could on his hair? Is it reasonable to say that human carriers are so numerous that attempted control over them is impossible or impracticable?

If we examine the present status of carriers of contagious diseases, we find that the laboratory can demonstrate a certain percentage of every population as diphtheria carriers, by the isolation of a diphtheria-like organism from the nose and throat of the individuals. Should that organism persist for a certain period, a virulency test determines whether the individual shall be held as a carrier. Similarly, in epidemic meningitis, the organism when present is primary evidence, conclusive evidence apparently residing in the agglutination test. If, on the contrary, we examine diseases not "contagious" but "communicable," such as typhoid and pneumococcic pneumonia, wherein are the carriers differently shown?

What then accounts for such inconsistency of terminology?

Should we now define "contagion" as the process by which a specific disease is communicated from one individual to another, either by direct contact or by an intermediate agent, we define the virus of the disease as residing in the case and in the carrier.

Investigation of diphtheria in the field, rather than the laboratory, shows that carriers are more contagious than the case; that isolation of the carrier when in the family prevents secondary cases; isolation of the neighborhood carrier prevents secondary neighborhood cases; isolation of the convalescent well case, when a carrier, prevents recurrent cases; oversight of those who have previously had the disease will find certain of those individual carriers at some particular time. The same holds true regarding scarlet fever and measles, as I have shown. We have known the same to hold true regarding typhoid fever though we have added here, the insect as a carrier also. If we examine the carrier in diphtheria for example, to find what he has that the case does not have, to account for transference of contagion, we find that he has a nasal discharge. We may exactly trace the number of cases to the acuteness, the amount of, and the area of personal or raw food contact of that discharge. Only moribund cases of diphtheria, with secondarily nasal infection, can cover such an amount of ground. In scarlet fever, similarly, we find contagion spread rarely by the case; then also it is directly related to a nasal discharge similar to that of the convalescent carrier, or the carrier who has had the disease previously. In measles the case may be more contagious than the carrier. Why? Because, until the rash appears, the average case is at full liberty, *with a running nose*. In typhoid fever the carrier is easily more contagious than the case for the first week or ten days. I have shown that diphtheria carriers may be detected by the eye as can those of scarlet fever. The laboratory may confirm both. Is it significant that the majority of proved typhoid carriers, other than convalescent carriers, have had some inflammatory trouble previous to the time they are carriers? It is the rule to find such a factor, or trauma, in the making of carriers of diphtheria or scarlet fever.

Varying grades of fresh, moist discharges from inflamed mucous surfaces of carriers, suffice to explain the varying grades of contagiousness or communicability of our common diseases, and these factors are not restricted to old time "contagious" diseases but are active in many "communicable" diseases also. Will not a study of all communicable diseases show that such communicability lies in the contagiousness generally predominant also in the carrier? I offer as suggestive, my procedures for attempted control of poliomyelitis of 1916. Sporadically known as not contagious, epidemically suspected of being previously quite so, poliomyelitis was dealt with in New York City by such quarantine as was applicable to

all contagious disease under the theory of fomite infection. Physicians added a surgeon's mask to the old-fashion cap and gown. (Had they stated that they were doing so to protect the little patients from some possible added infection from the physician, the measure would have been as praiseworthy as rational). A quarantine period exceeding any other routine one was prescribed. On July 11, with the report that all New York City was fleeing through this state, I arranged that all trains, as well as the Sound steamer, should be met by inspectors who recorded the names of all children under sixteen years of age who came from New York City. I had inserted in the newspapers an advertisement that all residents, having knowledge of residents of that city temporarily residing here, must report such individuals to the Board of Health. I thus had for examination nonresidents, as well as our own residents who had been visiting there. I was at the time especially concerned about the possible influx of diphtheria and scarlet fever carriers.

It is a matter of record that my observations on imported and local cases showed that I had to deal with an acute infection, in nowise different from what we had been having during the winter and spring, save that poliomyelitic manifestations were more frequent; the infection was as communicable, as contagious, as the nasal carrier or the adult convalescent carrier. Feeling my way along, I began to treat these matters from an educational standpoint, as well as from an administrative point of view, in nowise varying from the measures against diphtheria or scarlet fever. Release was similarly given. The result was that cases were as satisfactorily cared for at home; that there was little hysteria; the death rate per 1,000 inhabitants was creditable, while official expenses were noteworthily small. Of other communities in this state, one with a population of 19,159 had a death rate .412 per 1,000 inhabitants and spent \$11,000; another with a population of 30,622 had a rate of .784, spending \$13,000; a third with a population of 120,688, had a rate of .18, spending \$25,000, while New Haven with a population of 148,951 had a rate of .113 and spent approximately \$1,900. While such figures are not evidence of wherein the disease was contagious, they are mentioned because, as is known, all communities spent at least one-fourth of their health budget on this disease alone, by enforcing all the measures formerly used with "fomites" as the theoretical basis.

Confirmatory evidence that the disease was contagious through carriers is now afforded by the extensive case reports of New York City. The wide number of instances of multiple cases are definitely related to carriers; one extraordinary case was that of a convalescent adult. An epidemic in an apartment house in Baltimore recently reported on, can as definitely be shown to come into this category. No less significant is the recent stand taken by New

York City that the disease in future will be cared for like scarlet fever.

I believe that the following comparative table of cities under similar climatic conditions is a fairly strong proof of the rationality of my arguments. The figures express the death rate per 1,000 inhabitants for the year 1916, taken from the Public Health Reports, save that those of Hartford are expressed in figures as reported to the State Board of Health, to conform with Bridgeport and New Haven who reported nonresident deaths as well.

	New York City	Provi- dence	New Haven	Bridge- port	Hart- ford
Diphtheria. . . . .	.184	.298	.147	.189	.189
Measles. . . . .	.088	.251	.04	.107	.361
Scarlet fever. . . . .	.017	.055	.033	.033	.018
Typhoid fever. . . . .	.038	.051	.08	.09	.180
Cerebrospinal meningitis. . . . .	.030	.078	.066	.074	.018
Poliomyelitis . . . . .	.437	.078	.113	.188	.09
Total. . . . .	.794	.811	.479	.681	.856

I have given the statistics of these cities having similar climatic conditions for the reason that I have repeatedly shown previously that such conditions are great factors in making carriers, as well as aiding in the recognition of them. The first confirmatory evidence that such is true now appears from the recent English investigation of meningitis carriers. They show that a large part of those who are carrying the meningococcus, and who apparently have given rise to cases, have acute local inflammatory conditions. I believe they have missed the true significance of this in the light of what I have shown to be true of carriers, in that they state that this condition has nothing to do with the contagiousness of the carrier.

There is one last rather suggestive evidence of the correctness of my argument on contagiousness. It has ever been recognized that following an epidemic of measles, diphtheria becomes more frequent. Practically the only observation that has been made is that nasal diphtheria at this time predominates over faucial. Through July of this year this city has had 1,866 cases of measles with 20 deaths. A neighboring city has had during the same period 469 cases and 14 deaths. During the earlier months, and especially during the height of the greatest number of cases of measles, this city was averaging 3 to 4 cases of diphtheria weekly, the other city 2 to 3. In the last two months of the period this city was averaging 1 to 3, the other city 5 to 8. Further, this city had 6 deaths from the disease during the earlier months, contrasted with 7 for the same period for the other city. But—during the latter period, the other city had 11 deaths as contrasted with 4 here. I not only kept down the incidence of diphtheria during the height of and after measles, I kept down actual deaths. The accomplishment was made

possible by personally seeing every convalescent case of measles. As described by me previously, nasal convalescent carriers are frequent. Their restraint for as long as, in one case, 8 weeks after apparent recovery from measles did not prevent one case of diphtheria in a visitor; it would not have prevented unknown numbers, had the child been allowed street freedom, and the sum total of even half a dozen such carriers gave definite results.

Before closing, I cannot but deplore the status of much of recent literature on the communicability of diseases. It directly contributes to continuance of old methods, although preaching definite control over such diseases through human carriers. A few selected instances will be presented.

An epidemic of sore throats among students is shown by the laboratory findings to be due to the use of metallic bubblers. There is no mention of looking over all those students for one or more carriers who can spread virulent germs much more easily, if not more rationally, than the metallic bubbler.

An epidemic of mumps and appendicitis diagnosed by the laboratory as probably due to streptococcal milk, becomes a need for pasteurizing such milk, although it is stated that there was not any frequency of such diseases in adjoining towns where the products were sold which contained the streptococci. The statements that groups of students had such troubles and that possible waiters may have been the factor is all that is touched on from a more rational standpoint.

Again, a recent typhoid epidemic was laid to milk through a known carrier that was found. The fact that an adjoining region using the same milk was free from the disease, was cause for indecision as to how the carrier contaminated the milk. There were given data that there were privy vaults adjoining the dairy. There were no data given or apparent attempt shown, to prove that that known carrier did not use said vaults, and that flies were the immediate cause of a localized epidemic. Had the ages of the victims been given, even more data would have been available for the solution.

A final instance of newspaper notoriety relates as well to the injustice that may be done an individual. With a frequency of so-called septic throats in a neighboring city apparently on one milk supply, physicians of this city found that there was a group of sore throats among individuals who were apparently supplied by the same source. On the evidence of two physicians in the other city who affirmed that they had 60 cases 90 percent of which were among children using the milk, coupled with the asserted fact that 30 students ill in this city all drank the same milk, and that there were many such sore throats in a smaller town also supplied by that milk, the proprietor voluntarily stopped the supply pending

investigation. The facts mentioned, and the finding of a milkman on the premises who had had a sore throat, were sufficient data for the two health officials. The findings were that 400 cases were caused by this milk; that the epidemic stopped with stopping the milk. One of the two health officials who had always favored clean raw milk that is supplied to his city, became an instant advocate of compulsory pasteurization, which would have prevented the epidemic. An investigation of available physicians' lists of sore throats, treated for a period one month previous to the epidemic and one month after it stopped, showed that there was no relation to the milk supply in the city or the town mentioned. The 60 cases of the two physicians became about half, and were mostly secondary household neighborhood infections. The frequency of cases in the city mentioned was the same throughout the period before and after the epidemic; that of the town mentioned was almost entirely on other milk; the student frequency, both from their written testimony and from their dormitory addresses was definitely traceable to contact, being related to previous sore throats of the spring and winter. Of interest was a definite relation of these to scarlet fever of the previous spring, and to measles and German measles of the following fall. With a thoroughbred herd valued at over \$60,000 idle, a fine business of a certified grade ruined, a college graduate was given greater newspaper notoriety than comes to a deliberate murderer.

SUMMARY.

Control of our usual communicable diseases is dependent on the rules and regulations of codes being based on the primary action against the carrier.

Such action demonstrates that contagiousness and communicability are synonymous words; that our usual diseases, called contagious, are as contagious primarily as the carrier; that those diseases called "communicable," but not "contagious," are in no less degree contagious than the carrier, when studied from that standpoint.

The present-day teaching that human beings are distributors of communicable diseases, should be supported by initial attention to them, rather than to "fomites," as a matter of justice to modern public health as well as to the public, by investigators as well as by public health officials.

AN EASY AND SATISFACTORY METHOD OF MAKING AND INDEXING SURGICAL CASE RECORDS.*

By G. PAUL LAROQUE, M. D., F. A. C. S., Richmond, Virginia.

The usefulness of carefully kept, sufficiently complete, and conveniently indexed records of all patients treated by surgeons has long been recognized. The necessity for such records has been emphasized by the American College of Surgeons in its eligibility requirements for fellowship in that institution. The minimum requirements concerning the data to be recorded with each case have been stipulated by the Board of Regents of the College and certain committees of the Clinical Congress of Surgeons. The necessity for these records, as a part of the follow-up system, to determine the end results of surgical treatment is quite obvious, and a practical demonstration of the feasibility of the application of records to the problems of hospital standardization and the standardization of the surgeon have been demonstrated by E. A. Codman. The enlarged field of usefulness of carefully studied case records bids fair to go a long way in placing clinical surgery on a truly scientific basis. The real profit to be derived from the systematic and earnest study of properly kept records contributes an amount of satisfaction and progress far outweighing the necessary trouble required in making such records.

For fifteen years I have made more or less elaborate clinical and surgical records of all cases coming under my care. During these years, through a process of evolution, I have devised two blank forms upon which one is able to record, in the briefest possible fashion, with the least possible trouble, most of the data necessary to fulfil the minimum requirements of the records of surgical cases. They conform in essentials to those adopted as standard by the American College of Surgeons and it is quite practicable to summarize all necessary data on the sheet, which is 11 by 8½ inches in size. This size conforms to that of the standard bedside chart and the record sheet can be kept with the latter as long as the patient is in the hospital. It will be noted also that it can be folded twice and is easily carried in the pocket. It will fit various sizes of filing cabinets. There is more space for writing in the complete diagnosis, both clinical and pathological, than there is on the average small card, thus making it possible to make the record complete in this particular for indexing purposes.

*Presented to the Richmond Surgical Society, May 7, 1917.

The diagnosis is made up of three separate divisions: *Chief*, including that for which operation is performed; *Coincident*, that which perhaps exists in the individual case but is not treated by operation; *Complications*, including those affections developing while the patient is under the care of the surgeon, especially after operation.

INDEXING.

We index the following data: name of patient; name of attending physician; each separate diagnosis; and each separate operation performed.

This implies the necessity for four small drawers aggregating in size the large drawer containing the folders holding the records, according to the plan of most filing cases. The card index system is ideal.

All the pathology must be made a part of the diagnosis, and a great advantage in indexing each separate lesion without reference to whether it is primary or secondary, principal or coincident, makes it practicable, when we have accumulated a sufficient number of cases, to restudy the subject upon the basis of our records, and learn the truth in a scientific manner.

It would perhaps be of considerable value if we would adopt the practice of pathologists in making a protocol of the clinical findings in the same way they do of post-mortem findings. Detailed histories, the clinical course, physical signs, laboratory reports, reports of special examinations and all correspondence are recorded and filed in the same folder with the summary sheets.

To distinguish between chief and coincident affections, and complications seems quite reasonable and it would perhaps stimulate us to more exact diagnostics if we would regard everything that the patient has when he comes under our care as chief, or coincident, and whatever develops later as complication. By keeping careful records of complications developing under our care, we should be able to cause a diminution in the number of the preventable complications and in the future to prevent certain complications which at the present time seem unpreventable. By analyzing the causes of certain complications we may " * * * effect improvement by enforcing control of those causes admittedly controllable and by finding some method of control of those causes which seem now to be beyond our control" (Codman). Since Codman's admirable system of recording and studying end results has been found so satisfactory, it is also quite necessary to index the imperfections and errors under the headings, which have been standardized largely through his efforts as follows:

Errors of skill, E-s. Errors of judgment, E-j. Errors of care, E-c. Errors of diagnosis, E-d. Calamities, C. Patient died, P-d.

A separate card is made for each of these. By indexing all such

errors and restudying the records, when we have a sufficient number, we may be able to secure data upon which we may effect improvement.

There would seem to be hardly any longer any excuse for a surgeon being unable to know his mortality in case he is questioned, and all the so-called slight imperfections should diminish each year.

The blanks, herewith submitted, make it easy to index the hospital in which the cases were operated upon. It seems also advantageous if we would index the names of the assistants, anesthesiologist, and sponge nurse. If we would index also the indications for operation, leading symptoms, and other important data of diagnosis, from a study of cases in groups, we should acquire data for improvement in diagnosis.

To keep records properly indexed does not involve a great amount of labor and time. A trial, if one is interested, shows that the whole plan is simple and easily carried out. With a little instruction a young assistant or an efficient secretary finds it quite easy. Even if it did involve a great deal of time and labor, it is well worth it and it is a duty which we owe to the science and art of surgery, to the physicians from whom we receive our work and to the patients upon whom we practice it. My own case records are in my opinion the most valuable part of my library.

No. 17-2351.

CLINICAL RECORD.

	Office	First 5/1-17.
Name Mrs. Mary Doe.	Hospital Memorial.	Date
	House	Last 5/20-17.
Home address Richmond, Va.		
Referred by Dr. John Smith.		

		Result.
	Chief affections Uterus, fibroid tumor of.	Cured.
	Ovary, cyst of.	Cured.
	Appendicitis.	Cured.
	Hemorrhoids.	Cured.
	Cervix, laceration of.	Cured.

	Coincident affections Perineum, relaxed.	Not treated.
	Gallstones.	Not treated.
	Anemia, secondary.	Improved.
	Heart, mitral regurgitation.	Not treated.

	Complications Slight infection abdominal wound.	Cured.

Age 43.	M.....	Occupation Housekeeper. Religion Catholic.

Chief symptomatic complaint and physical signs *Excessive menses appear every 3 weeks, lasting 7 to 10 days, passes clots, moderate leucorrhea (yellow,*

at times stained with blood), bladder irritation (moderate), protruding "piles," indigestion (gas and distress after eating, constipation), general weakness, palpitation of heart. Has had one child, who is 5 years old. Had one miscarriage 12 years ago. About 16 years ago had an attack of acute abdominal pain and vomiting, sick a week. Has had slight attacks of this at intervals since. Examination shows the lacerations, hemorrhoids, and tumor as noted.

.....
 Remarks Gallbladder operation to be performed at a later time.

End result. O. K.

e. c.

No. 17-2351.

SURGICAL RECORD.

Patient Mrs. Mary Doe.

Richmond, Va.

Date 5/3-17.

Physician Dr. John Smith.

Surg. & Assts. LaRoque & Talbot.

Sponge Nurse Miss Jones.

DIAGNOSIS.

Clinical (Index).

Chief Uterus, fibroid of.

Ovary, cyst of.

Appendicitis.

Hemorrhoids.

Lacerated cervix.

Coincident Relaxed perineum.

Gallstones. Secondary anemia.

Heart, mitral regurgitation of.

Indications for operation Bleeding,
 anemia, tumor.

.....

 Complications Slight wound infection.

Pathological (Index).

Pedunculated large fibroid and
 several smaller ones.

Ovarian cyst (left); size, goose
 egg.

Gallstones and adhesions about
 gallbladder.

Operations performed Cervix, cauteri-
 zation of.

Hemorrhoids, clamp, cautery,
 and suture of.

Uterus, subtotal removal of.

Ovarian cyst (left), removal of.
 Appendectomy.

.....
 Drainage Two sponges in vagina.

Sutures to be removed Abdominal
 S. W. G.

Medication before operation Morph.

sulph. 1/6; atrop. sulph. 1/150.
 one-half hr.

General condition of patient beginning
 of operation Good.

Anesthetic Ether.

Amount 3 fluid ounces.

Duration 45 minutes.

Cond. during oper. Good.

Slight cyanosis.

Post-operative notes.

Note all severe or unusual signs, com-
 plications, such as pain, shock,
 bleeding, high and low tempera-
 ture, alterations of pulse and respi-
 ration, fright, excitability, delirium,
 stupor, nausea, vomiting, tympany,
 hiccough, cough, sneezing, hema-
 toma, wound infection, phlebitis,
 cystitis, urinary alterations and
 symptoms, and all abnormal phe-
 nomena, even of small importance.

1st day Retention of urine. Vomiting,
 pain.

Pulse Good. 80-90.	2nd day O. K.
Resp.	3rd day Enema and douche.
Treatment during oper. Hexamethyl-	4th day O. K.
enamin, 60 grs. in 4 pts. water	5th day O. K.
into bowel at close of operation.	7th day O. K.
Pulse at end of oper. 90.	10th day Slight pus from one stitch
Anesthetist Dr. Goldman.	hole.
Post-operative orders Morph. and	12th day Up in bed.
atrop. q. s. p. r. n.	14th day.....
.....	Day of removal drains 2 sponges
.....	Sutures 12.
.....	Day up in chair 14. Disch.....
.....	Post-hospital notes Convalescence 1
Signed G. Paul LaRoque, M. D.	month.

A HOSPITAL FOR CONTAGIOUS DISEASES IN A RESIDENTIAL QUARTER.

By CHARLES F. LYNCH, M. D., Lansing, Mich.

Previous to May, 1916, Lansing, although a city of some 50,000, had had no systematic health organization. The senior aldermen of each ward together with the Mayor, constituted the Board of Health, and a "part time" physician looked after the medical care of the indigent poor and the placing and removal of placards from homes in which contagious diseases were reported.

The facilities for hospital care of contagious disease patients were about such as might be expected under such a system of health organization. Contagious disease cases were handled in accordance with the old idea that they should be removed to some far distant section of the city where they would be inaccessible, and subjected to all forms of inconvenience and hardship, owing to a groundless fear of the dangers of the contagion.

The isolation hospital building which had done service up to the organization of the present health board in 1916, was a low concrete building on a vacant lot in an unsettled section of the city, on a street that had neither sewer nor water connections, and which, during the spring and early winter months, was frequently impassable.

The patients placed in this building were either left to care for themselves or untrained attendants were placed in charge of them. As a result of hardships and exposure which in this old institution, one patient instituted suit against the city for damages.

But, with the organization of a Board of Health along modern lines in May, 1916, one of the first problems to be taken up was that of establishing a proper isolation hospital. After a careful study of the situation and a consideration of various proposed sites in the city, the board decided on a location in a residence section of the city immediately adjoining the general hospital. The reasons which prompted the board in this decision were the belief, on their part, that a properly conducted isolation hospital can be maintained in a residence section without constituting a nuisance or a menace to the health of those living in the adjacent properties. The many advantages consequent upon the location in close proximity to the general hospital were such that this seemed the feasible location, if the institution could be conducted without danger to adjoining property owners.

However, the members of the city council were not so easily

convinced in the matter, and as a result they refused to appropriate funds for the purchase of the property on which the Board of Health had secured an option. At this juncture a private citizen came to the rescue of the Board of Health and purchased the property, which consisted of a lot with a forty-nine foot frontage, upon which was located a two-story, seven-room, frame residence building. As the board was without funds sufficient to replace this building by a modern hospital structure, it was decided to remodel the present building and convert it into a temporary hospital for the care of contagious diseases. When completed, the building provided three small wards on each floor, with a capacity of twelve patients, which by crowding has been increased at various times to sixteen. The walls, floors, and ceilings were all painted so as to afford a smooth surface which could be cleaned by the ordinary disinfectant solution. A small building in the rear of the lot, which had been used for a garage, was converted into a store room and dressing room for nurses and kitchen and laundry employees.

The first patients were admitted to this building on November 30, 1916, and since that time over one hundred cases have been handled successfully. All types of contagious diseases are admitted, and at various times during the winter smallpox, scarlet fever, diphtheria, measles and German measles have been at the institution at the one time. Following out the general plans as outlined at the Providence, Rhode Island, Contagious Disease Hospital, and the contagious disease hospital of the University of Michigan at Ann Arbor, we have handled the various contagious diseases in adjoining wards, allowing the same nurses to pass from one ward to another, taking care of the various types of infection without any resulting cross infections that could in any way be traced to this method of handling the cases.

Recently, during a period when the wards were overcrowded, a case of measles developed in a scarlet fever patient, a few days after her admission to the ward, and, before the measles eruption had appeared and the patient had been isolated, the infection had been transferred to another patient in an adjoining bed, with the result that a second case developed two weeks later.

On one occasion when the large number of scarlet fever cases requiring hospital care made it necessary, diphtheria and scarlet fever patients were placed in the same ward, and cared for by the same nurse without cross infections. On another occasion smallpox and measles were placed in the same ward, without transferring the infection in either case. However, in this instance the smallpox patient had previously had measles and the measles patient was vaccinated at the time he was placed in the smallpox ward.

Owing to the crowded conditions of the building, and the lack of numerous conveniences which are essential to the carrying out

of aseptic technic, all patients admitted to the institution are vaccinated against smallpox, regardless of previous vaccination history, and are revaccinated at the end of four days if they do not show a beginning "take."

In a period of practically six months, in which over one hundred patients have been handled by this method, we have had practically no cross infections among patients, and have had no infections in the nursing staff and none among the attending physicians and lay attendants.

When the institution was first opened and it was proposed to handle all the various types of contagious diseases under one roof, considerable difficulty was experienced to get nurses who were willing to assume the risk and responsibility incident to this radical change from previous local practice in the handling of contagious diseases. At the present time there is a decided change in the attitude, and numerous applications are on file for positions on the nursing staff.

Perhaps the most interesting feature of the entire experiment has been the legal controversy which ensued as a result of the establishment of the contagious hospital at this point. The adjoining property owners joined hands in instituting an injunction proceedings against the Board of Health, seeking to restrain them from conducting an isolation hospital in a residence section of the city. The case was heard before the local court, and a great amount of testimony was introduced to show the depreciation in property values which had and would result from the establishment of a contagious disease hospital in a residence locality. Testimony was also introduced on the part of residents of properties immediately adjoining, tending to show that they were unable to enjoy the privileges of their property rights, owing to the fear of the contagion from the isolation hospital. The depreciation in property value was not questioned by the Board of Health, but evidence was introduced to show that there was no danger from the location of the hospital at this point, and to show that it would not constitute either a menace to the public health or a nuisance, if properly conducted.

The records of the Board of Health show that not only were there no cross infections in the institution, but that there had been no unusual incidence of contagious diseases in the neighborhood immediately adjoining. In fact, decidedly the opposite was true. The city of Lansing experienced an unusually widespread epidemic of scarlet fever, with over eleven hundred cases of the disease, between October, 1916, and May, 1917. A very small percentage of the cases were located within a quarter of a mile radius of the isolation hospital, which is located in the center of the east side residence district.

After a careful review of the testimony of the case, the court

handed down a decision in which the contention of the Board of Health was fully sustained and the petition for an injunction denied. The language used by the court in handing down this opinion is particularly instructive and worthy of quotation. "If, as seems to be a fact," the opinion continues, "contagious diseases can be treated in properly appointed hospitals which are in close proximity to neighbors and the public without fear of spreading diseases, then such hospitals are not a menace to public health. If this is a fact, it is time that the public understands the situation and overcomes, in some measure, the unreasonable fear which has through the past and even in recent times entailed terrible suffering on innocent victims of contagious diseases, besides great financial loss to the community."

The court further says, " * * * a pest house as was maintained 25 years ago would unquestionably be a nuisance if placed near a residence. But it would seem from the evidence in this case that a revolution has taken place in the care and maintenance of such establishments. Even the word 'pest house' has been dropped and the name detention hospital has been adopted. The detention hospital, today, is clean, sanitary, and conducted like modern hospitals."

The conclusions reached from this experiment have been particularly instructive in a local way and will no doubt prove of interest to public health officials in other communities, where opposition is met on the proposal to depart from the old-time practices in handling contagious diseases, and to adopt humane methods in conformity with modern scientific knowledge of the modes of conveyance of infection.

THE RATIONALE OF POLLEN EXTRACT THERAPEUSIS OF HAY FEVER, WITH A REPORT OF 127 CASES.*

By NEWELL S. FERRY, M. D., Detroit, Mich.

The theory has been advanced and is generally accepted that hay fever is a symptom complex following a toxemia depending upon a parenteral digestion of proteins of certain pollen.

To Holbrook Curtis¹ has been given the credit of first endeavoring to produce an active resistance against the disease, although all writers have recognized the pioneer scientific work of Dunbar,² not only as regards the etiological relationship of pollen to the disease, but also as to his endeavors to establish the value of a specific antiserum. Unfortunately Dunbar's experiments were based on his erroneous conception of the similarity of pollen extract, the so-called pollen "toxin," to a true toxin. As a result, he was led into the error of attempting to prove that an antitoxin could be obtained which, *in vivo* as well as *in vitro*, would neutralize the pollen extract in a manner similar to the action of diphtheria antitoxin toward diphtheria toxin.

It has been conclusively shown that Dunbar's pollen extract is not a toxin, according to the generally accepted meaning of the term, as it reveals none of the characteristics essential to a true toxin. It is poisonous only to a small part of the human species and apparently innocuous to the animal species, except in large doses. It is thermostable, is not affected by acids or alkalies, and the intoxication has no incubation period, nor does it follow the law of multiple proportions.

Recently Cooke, Flood and Coca³ have stated that "Hay fever is the clinical symptomatic expression of local hypersensitiveness. The active pollen substances are not toxins."

As the extract is not a true toxin it is impossible to conceive of Dunbar's antiserum ("Pollantin") as being a true antitoxin, although in extremely large doses it might exhibit some neutralizing effect.

While Curtis, in 1900, reported favorable results against hay fever with extracts of the whole plants and flowers, it was not until 1911 that the first scientific work was carried out along lines of so-called active immunity. At that time Noon⁴ and Freeman,^{5,6} from the laboratory of the Department for Therapeutic Inoculation, St. Mary's Hospital, London, described their results with aqueous

*From the Research Laboratory, Parke, Davis & Co.

extracts of the pollen of grasses. The extracts were prepared after a method, first used by Dunbar for obtaining his pollen toxin, which consisted of the addition of distilled water to a certain amount of pollen, the extraction being aided by repeated freezing and thawing. Koessler^{7 8} at the same time was, in this country, working along somewhat similar lines with favorable results, but his findings were not published until 1914.

Prior to the work of Noon and Freeman, Dunbar had demonstrated that the application of a "barely invisible trace" of pollen to the conjunctival or nasal mucous membrane almost instantly produced most intense symptoms of hay fever in subjects sensitive to that particular pollen. The same experiment was negative to those not suffering with the disease. It was later shown also that aqueous extracts of the same pollen gave similar reactions. By this means was established a method of differentiating between those individuals sensitive to one pollen from those sensitive to another, and of determining equally well the exact resistance of a patient toward any given pollen extract. This diagnostic method proved conclusively that hay fever depended upon an individual predisposition and this, together with the fact that pollen extracts have been considered of a protein nature, led many to believe that anaphylaxis was the underlying cause of the disease. The conception that hay fever was a symptom of anaphylaxis and resulted from the parenteral digestion of the proteins of pollen was, however, first suggested by Wolff-Eisner.¹¹

The specific local reactions, manifested in hay fever sensitive individuals, following the ophthalmic, cutaneous, or intracutaneous applications of pollen extracts, seem to show that at times the blood and tissues contain a proteolytic ferment which is capable of splitting off the poisonous group from the pollen proteins. As a result of this cleavage the poisonous group, acting as an irritant, stimulates the local inflammatory conditions, which are recognized as the specific reactions. If these local reactions, and the general reaction known as hay fever, are the result of anaphylaxis the patient must necessarily have previously been sensitized. The method or methods of bringing about this primary hypersensitization have, however, never been satisfactorily explained. According to Koessler " * * * the individual disposition to hay fever may have been inherited or may have been acquired during any period of life." Cooke and Vander Veer⁹ conclude that "sensitized individuals transmit, to their offspring, not their own specific sensitization, but an unusual capacity for developing bioplastic reactivities to any foreign proteins."

In opening the way for the initial parenteral absorption of the protein which produces the acquired sensitization, something must have occurred which resulted in an interference with the normal

digestive function of the nasal mucosa, as it is generally believed that all mucous membranes will readily digest protein material under normal conditions with no untoward effects. Of the many explanations that have been forthcoming as regards the predisposing cause of the primary sensitization, perhaps the following are the most plausible: an insufficient nasal secretion concomitant with a lowered percentage of normal proteolytic enzymes; or an excessive accumulation of pollen, either accidentally inhaled or resulting from some abnormal anatomical obstruction. While the term "active immunity," originally used in this connection by Noon, is still a popular expression for this type of an increased tolerance, yet it is a question whether it is correct, and it will probably not be decided until the status of the protein molecule has been fixed and its relation to antigens has been determined. In a "Study of the Chemistry of Pollen Extracts" the author and Mr. Lewis Davis¹⁰ of this laboratory have found that the active principle appears to be of the nature of deuteroproteose.

PROPHYLAXIS.

Noon and Freeman, accepting the work of Dunbar, believed that the pollen extract contained a toxin and, on that basis, proposed a method of treatment aiming at the production of an active immunity. The same method is practically carried out today, although the rationale of the treatment is founded upon an entirely different premise. At the present time it is believed that hay fever results from protein sensitization and that a sensitized individual may be desensitized by compelling the body cells to exhaust all of the available specific proteolytic enzymes upon pollen protein artificially injected. Cooke, Flood, and Coca tell us that the mechanism of the alleviating effect of specific therapy is the same as that of desensitization in experimental anaphylaxis. In other words, a condition of anti-anaphylaxis is produced rendering the patient practically refractory or immune, so that when the protein reaches the mucous membrane, through the agency of the pollen in the natural way, it is not rapidly split up but is allowed to liberate the toxic part slowly, as under normal conditions, and the symptoms universally recognized as hay fever do not appear.

While several methods of desensitizing an individual against a foreign protein have been suggested, the most promising, as regards the pollen protein, seems to be by the subcutaneous route, starting with extremely minute doses of the protein, as represented by the pollen extract, and gradually raising the tolerance by increasing the size of the dose.

In order to determine a safe initial dose of the pollen extract, or a dose that will not produce a severe reaction, a very ingenious method, based upon the local reaction, as first brought out by Dun-

bar, was proposed by Noon. It was found that an individual, when sensitive to a certain pollen, always gave an ophthalmic reaction with an aqueous extract of that particular pollen and, by decreasing the strength of the testing material, a condition was reached when no reaction was discernible. This was considered the limit of the resisting power of the tissues of the patient against the extract, and by this means the exact status of the tolerance of the patient was determined or, in other words, the exact amount of extract, which could with safety be injected into the patient, was estimated. In this country the cutaneous or intracutaneous methods of diagnosis have apparently supplanted the ophthalmic, as they not only give a more accurate index of the patient's resistance, but also permit of several tests being carried on at the same time, to be repeated daily if necessary.

With these means at hand for making a correct diagnosis and of estimating the resistance of the patient toward any pollen extract there is practically no element of danger in the treatment, provided single extracts are used. Multipollen extracts or extracts of pollen to which the patient is not sensitive should not be injected subcutaneously until more is known of the subject of protein sensitization and the exact relation of the protein molecule to hay fever has been determined. There is an element of danger in sensitizing the individual, during the course of the treatment, to a protein of a pollen which the patient, up to that time, was able to digest and absorb with safety. And, for this reason, a patient should not be injected with pollen extract before the diagnosis has been determined, and the specific relation has been established between the extract in question and the pollen to which the patient is sensitive.

POLLEN.

While it has been shown by Scheppegegrell,^{12 13 14 15} President of the American Hay-Fever-Prevention Association, Goodale^{20 21} of Boston and others, that a large number of pollens will produce hay fever, and that the disease may be found at any time of the year, yet, with the great majority of cases, in this country, there are but two distinct seasons corresponding to the pollenizing of the two classes of plants, the Graminaceae of the spring and the compositae of the fall.

Scheppegegrell^{16 17 18 19} has given us four groups which cover nearly all the hay fever cases; the Ambrosiaceae, Graminaceae, Artemesiae, and Chenopodiaceae.

Treatment with pollen extracts is also much simplified by the fact, in a large percentage of cases, that sensitization to one member of a plant family or group may be diagnosed by using extracts of the pollen of other members of the same family or group, making it necessary to determine only the member giving the strongest

or the most typical reaction. This has been corroborated, in whole or in part, by Freeman, Goodale, Koessler, Cooke and Vander Veer, and Scheppegrell.

As a result of a large amount of experimental and clinical work the past few years, the most important members of the various groups have been shown to be as follows: ragweed pollen of the Ambrosiaceae, timothy pollen of the Graminaceae, mugwort pollen of Artemisiae, and the chenopodium pollen of the Chenopodiaceae.

The popular notions relative to rose colds and golden rod fever have practically been ruled out, as the majority of observers maintain that only wind born pollen are to be considered in hay fever.

EXTRACTION OF POLLEN.

Dunbar extracted the pollen with distilled water or salt solution, aided by freezing and thawing.

Noon's method was practically the same as Dunbar's with the exception that Noon sterilized his extract by boiling in sealed glass tubes.

Koessler first thoroughly broke up the dried pollen in an agate mortar and then extracted with 8.5 percent saline solution. This extract was diluted with ten times its volume of distilled water to make a .85 percent solution of salt. He used 0.25 percent phenol as a preservative. He also prepared a dessicated extract by precipitating his saline extract with ten times its volume of 95 percent alcohol, the precipitate being filtered and dried. Koessler claims that his saline extract deteriorates very rapidly, producing, by progressive proteolysis, a toxic product within 8 to 10 days. He maintains that his concentrated extract can be kept on ice for three weeks.

Goodale makes a 12 to 15 percent alcoholic extract. He, also, makes the statement that his extract will deteriorate within a short time, especially if exposed to the air.

Sormoni²³ extracted first with distilled water, after which he made a physiologic salt solution and added carbolic acid as a preservative.

Oppenheimer and Gottlieb^{24 25} extracted the pollen with 5 percent sodium chloride in 0.5 percent carbolic acid solution after being ground in mortar with sand. The mixture was then placed in a thermostat for 72 hours, after which it was precipitated with eight volumes of absolute alcohol and filtered quickly. The aqueous extract, according to these authors, deteriorated on standing.

Lowdermilk²⁶ first ground the pollen in a damp state with 0.5 percent carbolic acid solution. It was then diluted and stock solution allowed to stand in a cool place.

Clews²⁷ first removed the oily membrane from the pollen with acetone before extracting.

Cooke²² extracted with 0.8 percent sodium chloride in n/100 NaOH in a mortar with sand, precipitated with three volumes of acetone and redissolved in 0.8 percent sodium chloride, and then filtered through a Berkfeldt filter. His later work was done with an extract which was not precipitated.

The author, after trying several of the preceding methods, found that the simplest was the most practical. He ground the pollen in a ball mill with 0.85 percent saline solution in .05 percent high coefficient phenol. This mixture was diluted and shaken for 24 hours, after which it was filtered through a Berkfeldt candle and then standardized. The final extract, unlike those of Koessler, Goodale, and others, will not readily deteriorate. It has been found potent in a dilution of 1 to 100,000 in room temperature over a year after its preparation, and after two years when kept at refrigerator temperature. It is the author's opinion that an aqueous extract, if properly prepared, will remain stable under ordinary conditions for at least two years.

STANDARDIZATION OF EXTRACTS.

There are practically but two methods of standardizing pollen extracts; one based on Noon's method of diluting an extract made from a certain amount of pollen and the other by determining the total nitrogen in a given amount of extract and diluting accordingly. In both cases the extracts are compared with an arbitrarily determined unit.

Noon's method, which is the simplest, was followed by the author. Noon chose, as an arbitrary unit, that quantity of pollen toxin which can be extracted from the thousandth part of a milligram of pollen. In other words, one gram of pollen contains one million units of pollen toxin (active principle or protein). With this extract he determined the dilution which just gave an ophthalmic reaction in a susceptible individual, and regulated the doses accordingly. Until more is known of protein sensitization and its relation to the action of pollen extracts, this seems to be the most rational and the safest method of controlling the administration of the extracts, as it would be impossible to give any but a safe dose. Even if every lot of pollen extract were standardized according to the nitrogen content, the resistance of the patient should be determined, as with Noon's extract, for all sensitized individuals are not resistant to the same degree.

In order to simplify the method of administering the extracts as much as possible the author made three dilutions as follows:

Dilution No. 1, 1-100,000 or 10 units per c.c.; No. 2, 1-10,000 or 100 units per c.c.; No. 3, 1-100 or 1,000 units per c.c. With these dilutions any amount of extract may be injected from one unit or less up to 1,000 units, and by using a graduated syringe the amounts

will range from .1 c.c. to 1 c.c., it not being necessary to inject more than 1 c.c. at one time. Even with an ordinary syringe the calculations can be made with enough accuracy to warrant the injections being given with safety.

REPORT OF CASES.

At this time the author wishes to report the results of the prophylactic treatment of 127 cases, 9 treated with timothy pollen extract and 118 with ragweed pollen extract.

All but two of these cases were diagnosed with the intracutaneous test; 100 unit solution being used. The remaining cases were diagnosed with the cutaneous test; 1,000 unit solution being used.

Of these 127 cases, 86 (68 percent) weathered the pollen season with practically no symptoms. These cases were tabulated as *relieved*. Twenty-two cases (17 percent) were more or less relieved, although at times they were greatly annoyed with symptoms of hay fever; tabulated as *benefited*. Nineteen cases (15 percent) were not relieved, in fact, two cases were made worse by the treatment.

RESULTS OF PREVIOUS INVESTIGATORS.

It is impossible to compare the results of previous workers, as all cases were not tabulated the same, and all extracts were not prepared under similar conditions. The conclusions, therefore, can only be tentative, but at least they give an idea of the general trend of results.

Some authors, in their tabulations, use the terms "cured," "greatly relieved," and "not relieved." As it is impossible to say whether a case is cured, or relieved for the season only, the author has tabulated all cases under three headings; relieved, benefited and negative. All cases tabulated as cured and greatly relieved under the heading relieved, and all cases more or less relieved, under the heading benefited.

The following tabulations are of the cases treated with pollen extract reported in the literature to date, with a comparison of the present series:

PROPHYLACTIC TREATMENT.

Author	Cases, number	Relieved, percent	Benefited, percent	Negative, percent
Sormoni.	14	85.7	....	14.3
Others reported by Sormoni.	19	100	....	....
Lowdermilk.	3	100	....	....
Manning ²⁹	21	66.6	19	14.4
Oppenheimer and Gottlieb.	84	83.3	....	16.7
Ellern ³¹	13	46.2	38.5	15.3
Clowes.	8	100	....	....
Howe ³³	16	62.5	....	37.5
Strouse and Frank ³²	16	25	37.5	37.5
Cooke and Vander Veer.	450	71	18.5	10.5
Total.	644	74.3	11.3	14.7
Present series.	127	67.7	17.3	15
Total prophylactic.	771	70.9	14.3	14.8

PHYLACTIC TREATMENT.

Author	Cases, number	Relieved, percent	Benefited, percent	Negative, percent
Oppenheimer and Gottlieb.....	15	53.3	....	46.7
Sormoni.....	12	33.3	25	41.7
Others reported by Sormoni....	3	100	....	....
Lowdermilk.....	16	81.2	....	18.8
Ulrich ³⁰	11	90.9	....	9.1
Strouse and Frank.....	5	60	40	....
Howe.....	26	42.3	57.7	....
Lovell ²⁸	5	100	....	....
Cooke and Vander Veer.....	209	69.2	23.1	7.7
Total.....	302	70.0	16.2	13.8

TYPE OF TREATMENT NOT SUFFICIENTLY DESIGNATED.

Author	Cases, number	Relieved, percent	Benefited, percent	Negative, percent
Noon and Freeman.....	84	64.3	26.2	9.5
Koessler.....	41	80.5	12.2	7.3
Total.....	125	72.4	19.2	8.4

TOTAL OF ALL CASES.

Type of treatment	Cases, number	Relieved, percent	Benefited, percent	Negative, percent
Prophylactic.....	771	70.9	14.3	14.8
Phylactic.....	302	70.0	16.2	13.8
Type of treatment not designated	125	72.4	19.2	8.4
Total.....	1,198	71.1	16.5	12.4

NEGATIVE CASES.

Of the negative cases there are manifestly three separate classes or types: those that are not desensitized, those that are made worse by the treatment, and those that are desensitized to one pollen while remaining sensitive to some other pollen or pollens.

No doubt many of those in the first class would finally reach a state of complete anti-anaphylaxis if larger doses of the extracts were given. This method would theoretically call forth and use up the remaining specific proteolytic enzymes. A few individuals are found who will stand and apparently demand larger doses of the proteins before a proper neutralization of their ferments is obtained. For patients of this type the doses should be increased and treatment should continue even after the pollen season has begun and symptoms of hay fever made their appearance.

On the other hand it is hard to explain why some patients are made worse by the treatment. As a rule this type of a case will stand the treatment up to about 200 to 300 units and then symptoms of hay fever will appear after each treatment, as severe and at times worse than the disease as found during the pollen season. Attempts have been made to desensitize these patients by repeating the treatment, starting again with small doses and gradually increasing them, but they have failed. When the dose reaches a certain

size, symptoms will again appear. It is a question whether favorable results would not follow if the proteins were introduced by some other route.

In order to relieve those of the third type it would be necessary to determine the individual pollen producing the symptoms and treat accordingly.

REMARKS.

1. The 1-1,000 solution (1,000 units) should be used for the cutaneous diagnostic test.

2. The 1-10,000 solution (100 units) should be used for the intracutaneous diagnostic test.

3. It is not necessary at first to test the resistance of the patient, as the large majority react with the 1-100,000 solution (10 units). It is safe to start all cases with two units and increase the dose as rapidly as possible, depending upon the general reaction of the patient to the extract; injections being given about every two or three days. If symptoms of hay fever make their appearance as a result of the injections, the dose is too large, and the subsequent doses should be smaller.

4. Experience has taught that the average individual requires from ten to fifteen injections—not exceeding 1,000 units for the final dose—to produce the resistance necessary to insure against attack. In other words, it takes about 3,000 units, or the extract from three centigrams of pollen, to completely desensitize a patient.

5. For phylactic treatment sufficient figures are at present not available. Some cases have been aborted after two or three injections while others have received over ten injections before any signs of improvement have appeared.

6. Prophylactic treatment where possible is preferable to phylactic.

7. The question naturally arises, how long does the apparent immunity or the desensitization last? Freeman⁵ the only writer who has attempted to answer this question gives the following: "It will be seen that where a patient has been inoculated for one year with complete success, he has in the next year complete, or almost complete, immunity, but that in the third year he has only slight immunity left. Where patients have been successfully inoculated for two years, they have, as might be expected, complete immunity during the third year, and time will show how long this complete immunity will last. When patients have been only partially immunized for one or two years, little, if any, immunity is carried over to the year during which they have ceased the inoculations." As these deductions are based on only twenty cases, it would seem necessary to await further reports before drawing any definite conclusions. From a theoretical standpoint, Cooke, Flood, and Coca have answered as follows: "The freedom from symptoms lasts as

long as the respective 'antigenic' substances remain in combination with the antibody-like substances."

8. Railroad or automobile trips, through sections of the country where pollen abounds, are extremely liable to break down the acquired resistance of those who would otherwise be free from the disease under the ordinary conditions of every day life. Extreme exposures should be avoided as much as possible as desensitization is not always absolute.

9. From the present knowledge of protein sensitization, multi-pollen extracts or extracts of pollen of different groups or families to be used in a "gun shot" sense are not indicated.

CONCLUSIONS.

When single extracts are used and proper precautions taken, pollen extracts give us one of the most, if not the most, scientific methods of prophylactic treatment known to medicine. The reasons are these: the diagnosis can be made, the exact dose calculated, and the resistance of the patient determined before, during and after the period of treatment.

Seventy-one percent of cases are relieved of practically all symptoms, and at least 16 percent more are more or less benefited.

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MISCELLANEOUS

WAR MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

A war meeting will be held at Washington, D. C., October 17-20, 1917, by the American Public Health Association. This will replace the annual meeting which was to be held at New Orleans, La., December 4-7, 1917.

The papers and conferences will deal largely with the health problems created by the great war—the food supply, communicable diseases among soldiers, war and venereal disease, war and the health of the civil population, etc.

President Wilson has said: "It is not an army we must shape and train for war; it is a nation." Go to the Washington meeting; then come back and do your bit!

Washington will be crowded, and those interested are urged to reserve hotel accommodations at once. It will be easy to cancel reservations; but it may be impossible to obtain rooms at the last moment. Any hotel or railroad can give a list of Washington hotels.

Preliminary programs will be automatically mailed to all members of the American Public Health Association about September 15. Nonmembers may receive them free by writing to The American Public Health Association, 128 Massachusetts Avenue, Boston, Mass.

PHYSICIANS' LEASE COMMITTEE OF THE CHICAGO ROTARY CLUB.

The Chicago Rotary Club has learned that a great number of physicians who have enlisted for service during the present war are embarrassed by unexpired leases. In certain cases such corporations from whom they rent have refused to cancel leases. It seems to the Chicago Rotary Club that when physicians are so much needed in the United States Army, every effort should be made to relieve them of contracts rightfully binding in times of peace, but which might better be waived in times of national peril.

We all know that the physician giving up an established practice to enlist makes perhaps the biggest sacrifice of us all, because his business depends absolutely on personal contact. The day he leaves, his business ceases. But his lease goes on. Yet our country is calling for more physicians, and many patriotic doctors everywhere are trying to arrange their affairs to go.

It is possible to create a strong public opinion favoring the canceling of leases in such cases. If advisable, the matter can be carried for consideration to Congress. But first, the Physicians' Lease Committee wants figures and facts and is sending a letter to 20,000 physicians scattered all over the United States, asking them personally to help by promptly filling out and mailing back the inclosed postal card.

Co-operation will place in the hands of the committee the necessary data for an effective presentation of the facts before proper legislative bodies.

The Rotary Club wants to help. It believes, in fairness to all, a great work can be done.

BOOK REVIEWS.

PHYSICAL EXERCISES FOR INVALIDS AND CONVALESCENTS. By Edward H. Ochsner, B. S., M. D., F. A. C. S., President Illinois State Charities Commission; Attending Surgeon Augustana Hospital, Chicago. Illustrated. St. Louis: C. V. Mosby Company. 1917. Price 75 cents.

This little book, provided with illustrations for each exercise, will act as a convenient guide for anyone desiring to make use of daily calisthenics. The exercises are of the milder, less violent sort, and are well suited for convalescents.

BOTANIC DRUGS—THEIR MATERIA MEDICA, PHARMACOLOGY, AND THERAPEUTICS. By Thomas S. Blair, M. D., Fellow American Medical Association; Fellow Harrisburg Academy of Medicine, etc. Cincinnati: The Therapeutics Digest Publishing Company. 1917. Price, \$2.

While it is true, on the one hand, that most of our indispensable drugs are of botanic origin, it is equally true that not only the various national pharmacopœias, but also most of the text-books of pharmacology, are loaded down with a mass of botanic drugs, practically inert and chiefly of historic interest. It is the function of the modern "materia medica" to critically discuss these drugs, and to indicate which have survived in the estimation of the medical profession and which have not. This is accomplished satisfactorily in Blair's recent book, which both student and practitioner will find a useful guide.

MATERIA MEDICA AND THERAPEUTICS, INCLUDING PHARMACY AND PHARMACOLOGY. By Reynold Webb Wilcox, M. A., M. D., LL. D., D. C. L., President of the American College of Physicians; Professor of Medicine (retired) at the New York Post-Graduate Medical School and Hospital, etc. Ninth edition. Revised in accordance with the United States Pharmacopœia, ninth edition. With index of symptoms and diseases. Philadelphia: P. Blakiston's Son & Co. 1917. Price, \$3.50.

The usefulness of the ninth edition has been increased by separating the section on materia medica from that devoted to pharmacology and therapeutics. A voluminous index and a handy cross index between the two sections of the book prevents this separation from being of inconvenience. The book has been brought up to date with the recent edition of the Pharmacopœia, and should prove particularly useful to student and practitioner as a reference book.

SYPHILIS AND THE NERVOUS SYSTEM. For Practitioners, Neurologists, and Syphilologists. By Max Nonne, Chief of the Nervous Department in the General Hospital, Hamburg, Eppendorf. Authorized Translation from the Second Revised and Enlarged German Edition, by Charles R. Ball, Chief of the Nervous and Mental Department, St. Paul Free Dispensary; Neurologist, St. Joseph Hospital, Bethesda Hospital, Mounds Park Hospital, Minnesota Soldiers' Home, and State Home for Crippled and Deformed Children. 98 illustrations in text. Second American edition revised. Philadelphia and London: J. B. Lippincott Company. 1916. Price, \$4.

This is a translation of the second edition of Nonne's well-known monograph on syphilis and the nervous system. The translator, Charles R. Ball, has performed his task well, and much might be said in praise of the clearness of the precision of his English rendering. Not much can be said in regard to the

style of this book. In the original it is dry, dull, and hard. It is largely a compilation of facts and observations, put down without imagination and with no grace of diction or style.

The book is arranged in a series of lectures, or chapters, under particular headings. It is filled with statistics and statistical conclusions obtained by one who has had an unusual large material and remarkable opportunities for the observation and study of syphilis of the nervous system. Scattered throughout the book are case references which are given in outline. Not much can be said in regard to the value of these extracts from actual cases. They are incomplete and give the reader but a faint idea of the problem which they are supposed to illustrate. The chapters on pathology follow well recognized and conventional lines. The illustrations are not very illuminating, and some of them are extremely diagrammatic. However, most of the facts known in regard to the pathology of cerebral spinal syphilis may here be found.

The most interesting part of this book is undoubtedly those chapters which deal with the more recent knowledge in regard to syphilis of the nervous system. One turns to these chapters in the hope of finding some fresh point of view; some interesting notion of the author's; or, perhaps, some hint or illuminating consideration of the problem. The reader is apt to be disappointed, for Nonne is of the dryasdust type of medical writer to whom nothing appeals except the actual facts as he sees them. There is a certain curious dogmatic way of stating things, backed up by an appeal to large statistics.

The chapters devoted to the Wassermann reaction and the four reactions associated particularly with Nonne's works are perhaps the best chapters in the book. These are clearly described and one obtains from them an accurate account of the methods by which they are obtained, and the deductions which are allowed from the point of view of Nonne himself. As has been said before all this has been set down in a hard and fast way, and there is little room for difference of opinion.

On the whole the book may be said to be one of the best books, as far as absolute dry facts are concerned, which we have upon the subject of syphilis of the nervous system. There is very little that seems to have escaped the author's scrutiny; that is, very little as far as the German work is concerned. One finds very little recognition of the work of the English neurologists and extremely little of the American. The references to American literature are extremely scattered and one would say not very judiciously selected. There is a bibliography at the conclusion of the book which contains reference to all well-known German authors, but one looks in vain for references to the important work of Henry Head, of London, and in general to the English neurologists. In this way it is a typical German book.

This book undoubtedly should be in the hands of every neurologist, and every one who is interested in syphilis of the nervous system. It is a book, however, which one turns to without any particular anticipation of pleasure, because it is written without life, and, if one can say so of a book on syphilis, without vision.

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EDITORIAL.

THE DEPARTMENT OF PATHOLOGICAL ANATOMY.

With this issue the INTERSTATE MEDICAL JOURNAL presents what is apparently a departure in medical journalism in the form of a section devoted to pathological anatomy in its relations to practical medicine and surgery. It will be under the editorial supervision of Dr. Douglas Symmers, Professor of Pathology in the New York University and Bellevue Hospital Medical College, and Assistant Director of the Pathological Laboratories of Bellevue and Allied Hospitals. His contributions, appearing at frequent intervals, will be based on actual clinical observations correlated with post-mortem findings, supplemented, whenever desirable, by facts drawn from the literature. . . .

The creation of this feature, which should prove of practical value to the practitioner, was made possible by Dr. Charles Norris, Director of Laboratories at Bellevue Hospital, whose consent to utilize the immense resources of his department is acknowledged with gratitude.

EXPERT EVIDENCE.

We are all familiar with the classification of mendacity into 1, lies; 2, damned lies; 3, expert evidence.

This witticism, though hyperbolic, is a just expression of the state of mind produced, in a layman, by consideration of the contradictions, apparent or real, in the opinion evidence given on the same matter by different experts.

The fault is by no means always, or even often, with the witness; it is more usually the result either of inherent defects in the system of taking such evidence or of insufficient understanding of the subject matter by the lawyer putting the question. It is not infrequently happens that an advocate does not understand the difference be-

tween the technical meaning of a question put in a certain form of words and what seems to him to be the same question in another form of words, and we all know how little the lawyer likes to have dictated to him the form of a question to be put to a witness.

Contradiction in such cases is more apparent than real. The difference is not in the opinion given, but in the subject matter.

From time to time a sensational case occurs in which conflicting expert testimony arouses the public to a sense of something wrong in the state of the law which deals with this kind of evidence. There follows immediately a crop of correspondence from more or less well-informed parties, but soon the agitation dies down, and the matter is allowed to rest until some new sensation occurs.

From the very nature of things it follows that contradictory or seemingly contradictory evidence most often occurs, in a sensational form, in connection with cases in which the question at issue is one of insanity. This has the unfortunate result that scarcely any of the commissions or committees, official or nonofficial, which have endeavored in the past or are now endeavoring to deal with the matter of expert medical evidence, have taken seriously into consideration anything but evidence dealing with mental disease. The medical members of such committees have been psychiatrists, the remaining members lawyers, as it is only right, they should be.

Now, this is a doubly unfortunate state of affairs. In the first place because, of all medical specialists, there is none whose attitude in this matter is more likely to clash with the fundamental prejudices of a lawyer than the alienist. The reasons for this are not far to seek. The alienist, when giving expert evidence, tends to usurp a legislative function. Dissatisfied with the view that the law, rightly or wrongly, takes of responsibility, he attempts to introduce into his evidence, and to put before the jury, matters which, in the view of the law, are irrelevant. Further, when such a person acts as a member of a commission for reform of the *procedure* for taking expert evidence, he will with difficulty be restrained from endeavoring to cover the immensely more delicate question of a change in the *substantive* law with regard to the effect of mental disease on the responsibility for crime.

In the second place, it is to be regretted that only one branch of medicine should be represented on these committees, and that branch one which, if it produces the most sensational explosions of public opinion, is not, in fact, the branch which is most often called on for expert evidence before the courts. I think there can be no doubt that the bulk of medical expert evidence is given by surgeons and pathologists.

If evidence on mental diseases produces more sensational contradictions this is partly due to the difficulty with which laymen appreciate the finer shades of mental alienation, and partly to the

inopportuneness with which the alienist will so often attempt to remedy the defects of the law.

DRUG IDIOSYNCRASY AND ANAPHYLAXIS.

Clinical observations of anaphylactic reactions were at first confined to the accidents of serum sickness, in which experimental evidence was available to explain their causation.

Further familiarity with the phenomena of anaphylaxis, however, soon brought this agency under suspicion of being the cause of other acute symptoms complexes, notably asthma.

A consideration of the symptoms and course of some of the more fulminating drug idiosyncrasies, such as acute quinism, acute iodism, and the dermic manifestations of antipyrin hypersensitiveness, could not but call to mind the close analogy existing between them and the phenomena of anaphylaxis.

The books have very little to say about fulminating acute iodism, by which I mean an intense reaction with frontal headache, congestion of the conjunctivæ, severe coryza, painful gums, salivation, fever, and sleeplessness, which occurs in typical cases after so small a single dose as 3 grains of potassium iodide. These cases are passed over, or receive but brief notice. The attention of pharmacologic authors is concentrated on the commoner chronic and sub-acute forms of iodism.

If we are to accept as a working hypothesis the anaphylactic origin of these reactions, we must, in the present state of our knowledge, provisionally postulate not direct hypersensitiveness to the drug, but the presence in the body of proteins capable of being split up under the influence of such drugs, yielding decomposition products against which the organism has not time to elaborate antibodies.

Such an explanation, though admittedly theoretical, rings truer than any of the others that have been put forward by pharmacologists.

In the issue of *Paris Médical* for August 25 last, Doctors Héran and Saint Girons report a case of acute quinism which they have successfully treated, in accordance with the indications furnished by the anaphylactic theory of the etiology of that idiosyncrasy. Complete intolerance of quinine, in medicinal doses, was converted into perfect tolerance by the preliminary administration of a minute quantity one-half-hour before the main dose.

We have here an observation which, if confirmed, may prove an invaluable indication for the forestalling of the distressing and sometimes dangerous acute reactions to quinine and the iodides.

A CAPITALIST AND A SIX-HOUR DAY.

Machinery worked to the time limit; human beings giving a good six hours of work for six days a week; all capable persons working, no idlers. Such is the program and prediction of Lord Leverhulme for Great Britain after the war.

Lord Leverhulme is no armchair economist. He is the head of the great soap industry carried on in Lever Brothers' gigantic works at Port Sunlight, near Birkenhead, Cheshire, whose ramifications extend over the globe. He is a Liberal in politics, and has the distinction of being the only man who has ever tried to organize a trust (*sensu americano*) in Great Britain. His signal failure in this attempt, due to the astounding energy of the Northcliffe press, has served as a salutary lesson to all contemplating such an enterprise.

From the mouth of such a man the declaration which I have summarized in the beginning of this article comes with especial force. The endeavor to eliminate lost motion and overlapping in various fields of scientific research, and the planning of the field so that every man's energies may be devoted, and intensively so, to the work which he is best able to do in the common interest, have had for result that scientific progress, so far from halting, has in many branches made great strides during and because of the war.

But there has been also a decided improvement in the attitude of the public towards scientific work, a more thorough appreciation of the applicability of experimental data and scientific principles to every-day life.

In no direction has this tendency been more marked than in connection with investigations concerning the relation between fatigue and efficiency.

No doubt before the war physiologists had preached that, after a certain point, increase in the time worked did not produce a proportionate increase in the output; that when tested over a long period, the amount produced was absolutely and not merely relatively less with excessively long hours. Furthermore, they showed that monotonous work was injurious to the worker and that this injury was greater under the driving system.

The empirical and perhaps selfish "ca' canny" of the trades unionist was justified experimentally and sociologically. But, for the most part, these were voices crying in the wilderness and their warning fell on deaf ears.

The war has changed all this.

The greater leisure will enable the worker to continue his education during his earning period; it will improve home life, and it will enable the artisan to live in healthy garden cities, to the betterment of his life and morals and with incalculable benefit to his offspring.

FLAVINE.

In a collective abstract, published in the September issue of the *INTERSTATE*, the work of Browning and his collaborators on the new dyestuff antiseptics flavine and proflavine was epitomized. I prefaced this summary with a question as to what would be the attitude of the "physiological" school toward these discoveries.

The answer came quickly in the form of an article by Fleming, published in the *Lancet* of September 1, 1917. This was followed by an amusing, if not very discreet, reply from Browning, published on September 15 in the same periodical. Fortunately the personal element involved in this controversy is not present in an article by Hewlett on the same subject and covering very much the same ground as Fleming's article, and which was published in the *Lancet* of September 29.

The result of reading these articles is simply to fortify the impression that a new method of standardization for antiseptics to be applied in wound therapy is urgently necessary, and, incidentally, to confirm much of what Emery has said in the paper reviewed in the above-mentioned abstract.

Browning's results are not directly challenged, but only his deductions. It will be remembered that he stated that flavine, in the presence of serum, was germicidal in concentrations in which it was innocuous to leukocytes. This contention is traversed by his critics. The latter state that Browning's technic is fallacious in that, while he subjects the test organism to the action of flavine for twenty-four hours at 37° C., he submits the leukocyte to the same action for only two hours. They argue that, as the maximum germicidal power is not developed in two hours, the same is also true of the injurious effect of flavine upon the leukocytes.

If this concluded the matter, it would be indeed an almost fatal setback to the hopes of those who have built on flavine and proflavine. But, as I see it, there is still something to be cleared up, and that is the question how long does a leukocyte require to live in a wound before it accomplishes its task?

To sum up, it would appear that Emery's method of heavy inoculations in reconstituted blood is the best so far devised for the testing of the therapeutic value of antiseptics, and that a research is necessary to determine the time element which should rule the determination of the injurious action of antiseptics upon leukocytes.

One important point remains which has not been disputed, and that is that in flavine and proflavine we have two antiseptics whose action is enhanced by the presence of serum.

CHEWING GUM.

For some obscure reason man desires constant, gentle stimulation of the nerves of special and general sensation which innervate the mucous membrane of the mouth and nose.

To satisfy this, he has acquired the habit of chewing something, whether tobacco, betelnut, gum, or, in the case of the English ostler, a straw, and this practice is almost as widespread as the alcoholic habit. Its theoretical excuse is usually said to be that it acts as a physical sedative and as a mental stimulant.

Of all the substances so used, gum is probably the most innocuous, and it has merit to this extent that it replaces others decidedly more injurious and that it, to a certain extent, replaces smoking.

Again, the increase in the flow of saliva and the mechanical action of the gum are probably advantageous results of chewing gum, in moderation, after a meal, in that they serve to clean the teeth. The gum habit does not lead to spitting, which is very much in its favor. On the other hand, the continuous swallowing of saliva can scarcely be advantageous to the operations of the stomach; the movements of the jaw in chewing gum are far from elegant, and, to a perhaps prejudiced eye, there seems a hypertrophy of the masseter and associated muscles in the habitual chewer which mars the beauty line of many young faces.

Those Americans, however, who condemn chewing for these and other reasons need not take their compatriots to task for inventing the habit. The practice of chewing gum is of immemorial antiquity. So ancient is the habit that lexicographers are unable to decide whether the word "masticate" is derived from the name of the gum, "mastic," the basis of ancient and modern chewing gums in the Levant, or whether both are derived from a common Greek word *μασασθαι*, meaning to chew.

In the East, among the Moslems, especially after a meal in which garlic has figured, the ritual triple mouth-washing is followed by the chewing of gum. With a tear of gum mastic is taken a minute fragment of beeswax to give the required consistency. Pilgrims, returning from the Hedjaz, often bring with them wax for this purpose, gathered from the candles which burn around the tomb of the Prophet at Medina. It is probable that this oriental combination, being free from sugar, is, from the dental point of view, more hygienic than the gums which we know.

COLLECTIVE ABSTRACTS

THE X-RAY IN THORACIC WAR SURGERY—A REVIEW OF CERTAIN RECENT LITERATURE, WITH SPECIAL REFERENCE TO LOCALIZATION AND EXTRACTION OF FOREIGN BODIES.

By E. H. SKINNER, M. D., of the Editorial Staff.

A survey of much recent literature on the handling of thoracic war injuries indicates that there are two distinct divisions. One group of surgeons advocate the immediate attempt at removal of bullets and shell fragments and the other group is inclined to allow the clinical course of the case to determine their enthusiasm for surgical attack.

Another feature which attracts attention is the diversity of allegiance to methods of x-ray localization of fragments. The methods of localization are as numerous as the surgeons and radiologists.

In the text-books of military surgery which have been written or revised since the inception of the present war we find rather dogmatic statements as follows:

"No attempt should be made to remove a lodged missile unless it causes untoward symptoms. When easily accessible, in the chest wall, its removal should be undertaken with full knowledge of the risks involved in setting up sepsis of the underlying pleura, and, even in this location, if the projectile causes no inconvenience it is better to let it remain undisturbed, lest infection with acute empyema result from attempts at removal. * * * * Projectiles imbedded in lung tissue and against the spine are best let alone." La Garde, p. 242.

"If a foreign body is found, the question of what to do is a very difficult one to answer. On the whole, every chance should be given for the patient's lungs and thorax to recover as far as possible under healthy surroundings, and any attempt to remove the bullet or other fragment should only be made after the patient has had the full advantage of home hospital treatment." Murphy, p. 85.

"Foreign bodies in the lungs, if they give rise to no symptoms, should be left alone. Foreign bodies in the pleural cavity, if they give rise to no symptoms, may be left *in situ*, but, if there are much pain and discomfort associated with them, they may be removed after all pulmonary symptoms have subsided." Penhallow, p. 297.

Thus we see that when a medical writer produces a text-book his advice upon a debatable issue is conservative. The ephemeral war literature is not absolutely contrary to the above cited opinions, but there is undoubtedly a more radical tone to the articles dealing with the surgical attack upon foreign bodies in the thorax. The reviewer is interested further in that the articles in English journals are not quite so ambitious as the French articles. The French surgeons seem to be anxious to get the foreign bodies out as quickly as possible. They have therefore devised more elaborate apparatus for the exact localization by means of the x-ray, which x-ray localization can be

transferred to certain sterilizable apparatus which is used by the surgeon during the operation. Other French surgeons seem to be better satisfied with a cooperation of the radiologist and the surgeon at a combination operating fluoroscopic table.

Kellogg Speed, in the most recent article, engages in an argument for the early removal of foreign bodies in all situations, except those with complications of loss of blood, shock, and anatomic inaccessibility. His arguments are based partly on the economic issue and partly upon the fact that it will be possible to do more radical urgent surgery closer to the firing line. He maintains that there is too much delay between the original injury and the attention at the well-equipped base hospital.

It would seem that there has been a most elaborate system developed for the transport of the injured by ambulances, when what is really needed is the development of efficient field hospitals and casualty clearing hospitals, so that the foreign bodies may be removed and long suppurating convalescences avoided.

We have seen very little, if anything, in the literature about flying squadrons consisting of a surgeon and a radiologist, equipped with a fluoroscopic operating table and a field x-ray outfit, all of which may be easily transported close to the field of combat. Such a flying squadron can be arranged within and about an ambulance or lorry. In such a combination the radiologist becomes the eyes of the surgeon and the surgeon is the fingers of the radiologist. The two thus become a pair of foreign body sharpshooters.

To return, however, to the attitude of the English surgeons now in the field of war and their views upon our subject, one cannot quote better than from an editorial "On Gunshot Wounds of the Chest as Seen at a Base Hospital in France." This states that all foreign bodies are localized as soon as possible. If localization proves that a foreign body is near the surface, it is removed, under local anesthesia, when the lung condition has cleared up, but never in a great hurry. If, however, it is buried deep in the thoracic cavity no attempt is made to search for it, unless indications of a focal infection occur. They have only two cases where it was deemed necessary to remove a deeply lodged bullet. *It is, however, a matter of military importance that the patient should not know anything about the presence of a foreign body, as it may be the pretext for future malingering.*

A recent editorial in the *British Medical Journal* (August 4, 1917) indicates that there is a change of opinion regarding the old expectant treatment of gunshot wounds of the chest. Recent surgical experience shows that the lung is remarkably tolerant, and that all chest wounds in which a foreign body was buried might rightly be treated like, say, thigh wounds, by prophylactic or surgical cleansing operations (Duval). Again we quote: "That the operation for the removal of a foreign body which may very possibly cause infection, but will not certainly do so, is also legitimate, subject to two provisos—namely, that it is known to be large and can be localized precisely by the x-ray, and that the operation can be undertaken in what may be called the pre-sepsis stage, in other words, within the first twenty-four hours or so after the receipt of the wounds. * * * * It would appear that the treatment of chest wounds is undergoing, if it has not already completed, much the same evolution as the treatment of abdominal wounds underwent."

To turn now to French opinion we find that Duval thinks that intrapulmonary projectiles should be removed and that those in the lung periphery are removable without particular danger. Desgouttes advocates routine removal of projectile unless it is in the hilus; his 52 cases recovered. Villeon reports that, in over 200 operations for the removal of foreign bodies in the lungs, all but one recovered promptly and went back to the front.

X-RAY LOCALIZATION.

There seems to be little written upon the methods which the English pursue in localizing projectiles in the chest. It is reported that methods based upon the Mackenzie-Davidson cross-thread principle, and the measurement of the shadow traverse upon the fluoroscopic screen are useful procedures. These methods simply give the surgeon the information that the foreign body is a given distance from skin markings made by the radiologist. Such didactic facts are not sufficient, however, as the surgeon desires to know the relation of the foreign body to certain anatomic structures, rather than its relation to skin-markings.

The French seem to have tackled the problem from a different angle, which has resulted in the invention of the Saisse compass and the compass of Hirtz. The plotting of the foreign body location with these instruments is made by plates, or with the fluoroscope, and then the compass can be sterilized and used at the operation. If certain stable points of the instrument are placed upon identical surface marks upon the skin, a movable probe upon the instrument will indicate the spot of the skin underneath which the foreign body lies, and, if an incision is made at the point, the probe can be carried directly to the foreign body.

There appears to be some objection to the use of these instruments in that they take too much time for localization, but Beclere states that he can make at least twelve plottings each day with one instrument. It is, of course, understood that such elaborate x-ray methods are not necessary, except when the foreign body is within the chest, head or abdomen, and possibly the pelvis.

We note a healthy enthusiasm toward the combination of the radiologist and the surgeon operating upon a fluoroscopic table. Ombredanne and Lebourg-Lebard, who have written a neat text-book on localization, argue constantly in favor of such combination procedures. It seems so much more logical for the radiologist to be present at the operation and assist in the search for the projectile with the surgeon.

There is some discouragement to fluoroscopic operations by Flint who states that the screen does not show important structures to be avoided and that it is difficult to maintain asepsis. These arguments can be easily met, however, as it should not be more difficult to have a sterilizable x-ray screen than it is to use a motor saw or cautery outfit. Then, it is not the province of the fluoroscope to indicate other than the general anatomic scheme of things. Surgical orientation is a matter of regional anatomical knowledge.

Flint's scheme of localization seems a trifle long, but his reports indicate that it is certainly exact. He has developed, with his associates, a profundometer method consisting of the charting of cross lines upon a band encircling the limb or the chest and then transferring this metal band to a cross-section anatomy (Eyclesheimer and Shoemaker) so as to determine the best method of surgical approach. Just previous to the operation the direct Sutton canulas are sometimes inserted to the projectile in the chosen line of incision as an additional guide.

At a distance of several thousand miles and with only civilian experience we can ponder leisurely upon elaborate methods to localize exactly the mathematical or even the anatomical situation of a fragment, and we can demand material and apparatus and tubes and capable surgeons and experienced radiologists. But when we stop to realize that a hundred or more cases may demand localization of fragments within a few hours, and that apparatus is damaged and that x-ray plates are unusable from dampness, or broken or delayed in transit, and that your best bullet surgeon is sick or transferred, then will the radiologist, and the surgeon too, turn to the simple fluoroscope and literally feel their way to the foreign body with an aseptic x-ray probe.

As Masserine says, "To much must not be expected of the x-ray. The best results are obtained when the radiologist and the physician work together. Every radiologist should have a practical medical experience, and every physician should be something of a radiologist."

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ORIGINAL ARTICLES.

NEUROLOGICAL MANIFESTATIONS IN CLINICAL TYPES OF THE FEEBLE-MINDED.

By MAX A. BAHR, M. D.,

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In an attempt to present some of the neurological manifestations in the feeble-minded, it is necessary to emphasize that they are as various as are the underlying pathological and etiological factors. For example, the neurological manifestations brought about by a meningitis in no way resemble the picture presented by a feeble-mindedness brought about by a congenital hydrocephalus. From a purely mental aspect the just mentioned mental defectives might be placed in the same class according to a fixed intelligence scale, but they are entirely dissimilar from the viewpoint of neuropathology. The purpose of this paper is to take a certain number of cases which come under the feeble-minded group, according to a definite psychological standard, and summarize the various neurological symptoms, in order to determine the frequency of any one of such symptoms or group of such symptoms in the recognized clinical types of the feeble-minded.

The term feeble-minded is used in this paper in a broad sense and includes idiocy, imbecility, and the moron as ordinarily placed in definite psychological groups in accordance with the classification adopted by the American Association for the Study of the Feeble-Minded¹ which is as follows:

The *idiot* possesses a degree of mentality which does not go beyond that which is normal for the age of two. An *imbecile* cannot go beyond the mentality of a child of seven, and if the mentality does not develop beyond that which is normal for one from seven to twelve, the individual is known as a *moron*.

The cases considered in this paper have all reached the adult age, or have at least passed the age of puberty, and have been selected from the records of cases admitted to the Central Indiana Hospital for the Insane during a period of twenty years. Ninety-four cases are included in the study. Of this number, only six presented a fully developed psychosis. The remainder presented merely transitory abnormal mental states which justified their commitment as insane. Of the ninety-four cases, eighteen

were cases of idiocy, twenty-nine were cases of imbecility, and forty-eight were cases of the moron group.

The gross motor strength as measured by the dynamometer shows but little disturbance in the feeble-minded. It is somewhat diminished especially in the severer cases as in idiocy, but this diminution in general is not so marked that one can speak of a paralysis. Only when there is a diffuse lesion of the cortex, or when a meningeal process includes with it an involvement of the cortical motor area do we find pronounced paralyses.

Goddard² states that the dynamometer itself is a measure of the intelligence among the mental defectives. They are unable to exert their strength in obedience to the command, "Squeeze this as hard as possible," but whenever an exercise of strength is called forth by a natural situation and their action is impulsive or instinctive,



Fig. 1.—Brain of an adult idiot with congenital infantile cerebral paralysis. Weight of brain, 820 grams. Microgyria especially in right hemisphere. Marked atrophy and sclerosis of right hemisphere. Patient died in epileptic status. (From preparation of pathological laboratory of Central Indiana Hospital for the Insane.)

one discovers at once how great is the strength. I am familiar with the cases of several patients who could hardly make an impression upon the dynamometer, but, when they lost control of themselves and offered resistance, it required the assistance of three or four attendants to restrain them.

The cortical lesions may be of the most variable nature. There may be a thrombosis, a hemorrhage, a tumor and encephalitis, or a gumma. At times these lesions are congenital as will be noted in Fig. 1. In these cases one may expect to find two types of symptoms, first the special disturbances which are brought about by a circumscribed lesion as, for example, a hemiplegia, and second the symptoms of intelligence defect, which depend upon the secondary general cortical disease.

The frequency of such circumscribed lesions in the feeble-minded is very variable. Ziehen³ gives 20 percent. Waschmuth⁴ 11.9 percent. It can be definitely stated that in at least one-half of the cases of focalized cerebral lesions sooner or later there develops idiocy, imbecility, or the state of a moron. Huhner⁵ gives in his statistical findings 47.5 percent.

At times hemiplegic and at times paraplegic symptoms are noted and in the latter cases there is generally found a paralysis of both lower limbs or a paralysis of both arms and both lower limbs. A paralysis confined to both arms is very infrequent. Monoplegias are also very infrequent. Of our 47 idiots and imbeciles we could find a record of only 9.3 percent that presented one type or other of paralysis.

Dercum⁶ believes that the infantile hemiplegia or diplegia of idiots does not as a rule arise at birth, but occurs subsequently and usually has its origin in some infection. He believes that in rare instances it is prenatal in its origin and that, in such cases, simple prenatal arrest seems to be the causative factor.

In infantile cerebral palsy the growth of the paralyzed half of the body is greatly retarded as may be noted in Fig. 2. The bones upon the paralyzed side are shorter, frequently including the bones of the facial portion of the skull and likewise the soft parts, e. g., the eyes present diminished dimensions. In the paralyzed side of the body contractures generally occur in which the arms and legs assume a definite fixed position which, not only the patient himself, but likewise the physician is incapable of changing even with great effort. In the paralyzed arm flexion prevails, in the leg extension. Right sided paralyzes are occasionally accompanied with loss of speech (motor aphasia). The tendon phenomena in the paralyzed extremities are greatly increased, the plantar reflexes decreased. The Babinski is generally present. If the lesion is cortical the paralysis generally combines with Jacksonian epilepsy.

The tongue and facial musculature are frequently involved in the hemiplegia, and generally upon the side of the paralysis.

Paralyzes of the peripheral cranial nerves or the nuclei are infrequent. Only in the eye muscles are paralyzes frequently found or more frequently an appearance of deficiency which is generally the cause of the strabismus in the imbecile. The reason of the strabismus has not as yet been made entirely clear. The striking asymmetry of the facial musculature which is especially noticeable and frequently found in the buccal region in imbeciles is very frequently of central origin.

The sphincters of the rectum and bladder are relatively infrequently paralyzed. The incontinence of urine and feces in the feeble-minded child is generally dependent upon the psychical con-

dition, and is not to be considered a paralysis of the bladder and rectum.

CASE I.

Case I (Fig. 2) is one of imbecility due to infantile cerebral palsy. Male, age 55, single, white.

One cousin insane. At the age of 2 had an attack of "brain fever" following which he was partially paralyzed on the right side. At 19 he developed epileptiform convulsions which were confined to the paralyzed side of his body.



Fig. 2.—Case I. Right-sided paralysis. Marked atrophy of right side. Right hand tightly fixed in flexion and eversion at the wrist. Fingers tightly flexed over thumb and palm of hand. Right side of face smaller than left. Mental age, 12.



Fig. 3.—Case II. Hydrocephalic idiot. Strabismus of left eye. Bilateral optic neuritis. Spastic paraplegia. Note continuous Babinski phenomenon. Mental age, 2.

These convulsions first began in the face, then spread to the right hand and leg in the order named.

Examination.—September 7, 1916. Station is good with eyes open and closed. In walking the patient carries the right arm tightly held against the right side and describes a semicircle with the right leg. The right face and side of the body are cold to the touch. He wrinkles the brows equally well. There is no ptosis, and, against resistance, the left lid is more forcibly opened than the right. The pupils are found central and equal. They react promptly to light and to accommodation. There is no contracture of the visual field. The extraocular movements are well performed. There is no nystagmus. The

ear lobules are adherent and the right ear is larger and more prominent than the left. The right face and especially the lower portion appears smaller than the left. The right palpebral fissure is larger than the left. He can wink the left eye but not the right. At times he does not completely close the right lid. On forcibly opening the mouth the right corner is higher than the left. The left masseter is more strongly contracted than the right. The tongue is protruded straight in the median line and there is no tremor or atrophy. There is no aphasia or paraphasia. Speech is negative. Swallows well. The right lobe of the thyroid is enlarged. There is marked atrophy of the entire right side of the body, osseous and muscular. He has some power of elevation of the right arm through the action of the serrati. The right forearm is partly fixed at a right angle at the elbow, but there is slight power of flexion and extension of the forearm. The right hand is tightly fixed with eversion at the wrist and the fingers are tightly flexed over the thumb and palm of the hand. There is wrist clonus.

Circumference of right shoulder, 13; left, 16.

Distance to sterno-clavicular junction—left, 7.5; right, 6.

Circumference at elbow—right, 8; left, 9.75.

Circumference of forearm—left, 10.25; right, 7.5.

Circumference of fleshy forearm—right, 7.5; left, 10.25.

Circumference at wrist—right, 5; left, 7.

Nipple to sternum—right, 4; left, 4.5.

Circumference of left leg, 20; right, 15.

Circumference of knee—left, 14.5; right, 20.

Circumference of calf—right, 10; left, 13.

Right anterior superior spine to median line, 36; left, 35.25.

Circumference of ankles—right, 10; left, 10.

Circumference of plantar—left, 10; right, 10.

Circumference of dorsum of foot—left, 10.25; right, 9.25.

Circumference of toes—right, .8; left, .9.

Right anterior superior spine is higher than the left by 1.5.

There is some flexion, abduction, and adduction of the knee on the right side.

Tendon reflexes throughout the left side are more prompt than those of the right side. Babinski and Chaddock on right side. Corneal lachrymal and cremasteric reflexes are present on both sides; the umbilical not obtained on the right side but prompt on the left. Testicle sensation lost throughout the right side. Pin pricks were not appreciated over the right side nor on the sole of the foot, but several times during the examination the patient responded by flinching and muscular contraction as they were appreciated. Heat was felt only over the lower portion over the right lower limb. Senses of motion and position are not appreciated. No subjective sensory disturbances. Bladder and bowels normal. Patient has Jacksonian convulsive seizures on an average of two or three times a year.

A definite relation between the degree of feeble-mindedness and the dissemination of the circumscribed lesions does not always exist. These variable pathological anatomical lesions are comprehended as a whole as "feeble-mindedness with cerebral infantile palsy" or they may also be considered as "infantile palsy with feeble-mindedness."

Meningitis is one of the most important causes of feeble-mindedness, especially of the lower grades. Practically all types of meningeal inflammation may result in the development of idiocy or

imbecility. *Pachymeningitis interna hemorrhagica* is the most frequent affection of the dura. At times it is caused by traumatism, at times by hereditary syphilis. Meningitis likewise occurs in the course of acute infectious disease and disturbances of metabolism. Tuberculosis may be a factor. Acute purulent leptomeningitis, tuberculous meningitis, and epidemic meningitis are less frequently to be taken into consideration because as a rule they are much more fatal at an early stage.

Acute serous leptomeningitis is of greater significance, which may be combined with an internal hydrocephalus. Besides the immediate influence of the leptomeningitis upon the brain cortex, acute meningoencephalitis, and acute hydrocephalus with its increased pressure bring about a disturbance in the brain development and consequently a more or less decided imbecility.

Chronic serous leptomeningitis due to alcohol, syphilis, or other agents in connection with hydrocephalus internus is of special etiological importance. In forty-six cases in which it was possible to make a Wassermann of the blood, 39.1 percent gave a positive reaction.

Barr⁷ found hydrocephalus to be a causative factor in .07 percent of the feeble-minded.

CASE II.

Case II (Fig. 3) is a case of marked internal hydrocephalus with a very low grade of idiocy. Female, age 30, white, single.

Birth reported normal. At the age of three months patient is reported as having had an attack of "cerebro-spinal meningitis" and the family considers the present condition to be a sequel to that disease. At the time of the meningitis she had a very high temperature and the greater part of the time during the illness there was a temperature of 105° F. and over. Spasms appeared irregularly for several days. Following the meningitis she presented very little activity and even during the first year of life she did not appear to act like other babies. Later it was noted that the patient could not talk or walk and was incapable of apprehending the simplest things. Was incapable of learning and never attended school. At the age of twelve she was taught to walk a little with the aid of crutches but even at the present time unless supported is incapable of standing on her feet. She is a dwarf and presents an infantile make-up. Lower limbs are especially small and she is incapable of supporting herself on her limbs. No convulsions since a baby. Patellar reflexes are bilaterally increased, and the Babinski phenomenon is present. Has considerable control, however, of her lower extremities when lying in bed. Can raise and flex lower limbs upon request; can place upper extremities upon her head. Strabismus of the left eye noted. Motion, however, of the extraocular muscles free and unimpaired. At times will utter a few monosyllables but is not capable of connected speech. Is pleased when her relatives call to see her as is noted by her facial expression. Head is macrocephalic in type and patient during infancy and early childhood frequently manifested the hydrocephalic cry.

Examination.—July 25, 1917. She apprehends some of the ordinary things about her and knows her name, as, for example, she knows the meaning of the ringing of the dinner bell and knows the use of a key and similar things. Negative Wassermann of the blood and fluid. Cell count 5 per c.mm. Coordina-

tion not satisfactorily elicited by reason of the mental state. Circumference of the head, 26 inches. Patellar reflexes greatly heightened. In supporting her to walk she presents a decidedly spastic gait, bringing the limb forward with a sudden jerk and dragging the toes. Pupils are semidilated and respond to light, especially the right; the left responds, but within very narrow limits. Both respond to accommodation. Decreased sensibility to pain. Retracts limb on severe puncture. Tactile and thermic sensibility cannot be elicited by reason of the mental state. She gives an appearance, especially in the extremities, which are short, fat and chubby, suggesting an endocrin complication. She cannot move toes; moves fingers freely; left eye turns outward; forehead is very prominent; head and face asymmetrical. She is decidedly dwarfed.

CASE III.

Case III, female, 8, age 38, white, single, was a case of bilateral external hydrocephalus:

The patient was born defective and was never capable of learning. At the age of 15 she began to have severe headaches, with gradual and increasing impairment of vision. These headaches persisted for ten years and were not relieved by any sort of medication. At the age of 32 she became completely blind and ophthalmoscopic examination revealed choked discs and optic atrophy. All the other special senses became involved, especially that of hearing. Early she presented some incoordination, especially of the lower extremities, but there were never any tremors noted. Vomiting also occurred early in the disease, with other evidences of intracranial pressure.

Post mortem examination revealed a bilateral external hydrocephalus in consequence of an obstruction of the venous circulation which was due to congenital narrowing of the jugular foramen. All optic tracts were much atrophied.

Among the neurological manifestations in the feeble-minded, disturbances in coordination appear to be by far the most frequent.

In consequence of the developmental disturbance in the brain cortex in the feeble-minded, the ability for coordinate movements develops much later than in the normal child, and in severe cases of idiocy the ability to coordinate movements is never acquired at all. Certain movements in a normal child are developed as follows:

Ability to hold the head erect at the end of the 4th month.

Ability to hold body erect at the end of the 6th month.

Ability to stand at the end of the 9th or 10th month.

Ability to walk approximately at 18 months.

Ability to grasp and hold something placed in the hand at 5th month.

Ability to grasp an object, 6th to the 7th month.

In the feeble-minded child the ability to carry out movements designated above is delayed in a most marked manner. Only in the mild grade, in the moron occasionally, such retarded capabilities are not observed. Parents who are observant notice at times during the first few months an inability to coordinate the ocular movements. Weak-minded children learn very late to fix the attention and follow with the visual sense a particular object, while in normal children this is possible as early as the 2nd to the 4th week.

Aside from the capability to acquire the grosser movement co-ordination of walking, standing and grasping, etc., there are also in the weak-minded, frequent disturbances in the movements for the finer and more delicate accomplishments. Such patients learn very late, or not at all, to dress themselves or acquire a great deal of time even if they recognize their various garments. They stumble over the steps. At the table they muss themselves and drop their



Fig. 4.—Case IV. Microcephalic idiot. Divergent strabismus of both eyes. Patient attempting to stand with support by widely separating limbs. Note attempt to control ataxic movements of right arm by grasping firmly against body. Case suggesting Friedreich's ataxia. Mental age, 2.



Fig. 5.—Case VII. Syphilitic idiot. Saddle nose. Congenitally blind and deaf. Complete analgesia. High arch palate. Note carcinomatous development of left breast. Mental age, 2.

food and dishes to the floor. Such cases fail completely at gymnastic exercises. Only in the moron is the awkwardness of the movements at times not noted.

CASE IV.

Case IV (Fig. 4), male, age 28, white, single, was probably one developing a Friedreich's ataxia, merging possibly into the cerebellar type of the disease by reason of the very marked staggering and reeling gait and also an almost continuous Babinski phenomena with exaggerated bilateral deep reflexes, especially the patella.

The patient has been feeble-minded from birth and was admitted in this institution from the County Poor Farm.

Examination.—September 24, 1916. Small, well nourished, microcephalic idiot, who lies in bed with his hands clasped tightly over his face. He does not respond to requests or reach out after objects exposed to his view. Hair is of natural male distribution over the body. There is no apparent enlargement of the thyroid. He wrinkles both brows equally well; there is no ptosis or facial palsy. The eyes are blue and there is an external strabismus of slight degree. Extraocular movements are not impaired. The pupils are round, central, equal and react to light and accommodation. The visual field could not be tested. The bony palate is highly arched. The tongue is medium and shows no atrophy; the patient cannot protrude the tongue. There is no difficulty in swallowing, but the patient retains the water in his mouth a long time before so doing. There is no loss of motor power in the upper limbs. The patient reaches for a cup of water, and in the right hand there are a few side to side movements but no real incoordination in either arm. He threw the water into his mouth, spilling the greater part of it. He did not respond to requests to pronate and supinate the hands, etc. The biceps, triceps and wrist jerks are present, active and equal. Cremasteric and umbilical reflexes are present. The big toes are constantly held in position of dorsal extension and the foot resembles that of a Friedreich's foot. There is no atrophy or fibrillary tremors of the lower limbs. The knee and Achilles jerks are exaggerated, but not unequally so. There is a Babinski, Oppenheim, and Chaddock reflex present on both sides. The lower limbs present irregular movements, but the patient will not cooperate in the H to K, and H to T tests. When the heel is passively placed on the opposite knee there is no apparent static ataxia. The patient walks only with support, leaning backward on the same and walking with a very wide range, brings the heel quickly and heavily to the floor, before the other portion of the foot, the toes being held in a position of extreme dorsal extension. The patient when placed at the foot of his bed, grasps it tightly with both hands. With many irregular movements he gains the side of the bed and throws himself into and later rolls himself into position. The strabismus is a divergent strabismus of both eyes rather than confined to the left, and on rotating upward there is seen at times a nystagmoid movement of the eyes.

Examination.—March 1917, shortly after which the accompanying photograph was taken. Patient confined to bed. When lying quietly he makes very few movements, but on attempting to rise, or when he is supported by two attendants in attempting to walk, he represents wide range movements of all the extremities of a choreic type. There is an external strabismus of both eyes. At times nystagmoid movements of both eyes are noted. He presents no paralyses. Pupils are normal in reaction to light and accommodation. The tongue shows no atrophy. There is some difficulty in swallowing and the patient will retain water in his mouth for several seconds before he attempts to swallow it. Generally spills part of it. Cannot be made to respond to the diadokokinesis test. Cremasteric and umbilical reflexes present. On grasping objects lunges forward, with fingers wide apart, in a manner resembling very much the cerebellar asynergia of Babinski. Whether or not there is an optic atrophy could not be ascertained, as the patient would not submit to an ophthalmoscopic examination.

Incoordination in the finer movements of speech is frequently noted in the feeble-minded. Many idiots never acquire the power of speech. In the idiot and imbecile, not merely does the construc-

tion of sentences reveal a poverty of concepts, but the pronunciation of individual words shows a disturbance in articulation. Thus stammering is quite frequent. In normal children incorrect pronunciation or slight stammering generally ceases in the fourth year, but in the imbecile such stammering remains until the school age and at times continues throughout life.

The motor act of speech is retarded in the feeble-minded and the ability to understand spoken words is impaired. While the normal child at the age of 16 months can speak a few intelligible words and at the age of 18 months can use approximately from 20 to 60 words, it is found in even very mild cases that at the end of the second year, hardly a dozen intelligible words can be spoken. Very pronounced is the delay in the construction of sentences. The normal child is able at the end of the second year to speak in sentences; individual words, however, it uses much earlier in partial sentence construction. On the other hand, it is not infrequent that the moron does not learn sentence construction until the fourth or fifth year. Many imbecile children throughout life never learn to speak in sentences.

Finally, the difficulty in speech movements is dependent upon the fact that feeble-minded children learn with the greatest difficulty the application of grammatical rules.

In the majority of the feeble-minded learning to write is most difficult. This, however, is not due to the difficulty in learning the motor coordination in hand movements, but to difficulty in the comprehension and conception of letter formation.

Difficulty in reading is also due to the latter factor. In general the disturbance in speech is representative of the intelligence defect.

The following is the case of an imbecile with a hereditary syphilitic etiology. He manifested congenital retardation in speech and ability to walk and developed symptoms of juvenile paresis at the age of 17.

CASE V.

Male, 9, age 17, single. Father somewhat addicted to alcohol. Two paternal aunts insane and one brother feeble-minded. Mother and two half brothers gave a positive Wassermann. Three other half brothers show stigmata of degeneracy. At one year of age patient had convulsions and showed a partial paralysis for about two weeks. Made no attempt to walk until after he was two years old, and even then appeared stiff and awkward for more than a year. Learned to talk before he began to walk. Never took any interest in games as a child. Attended school from the 6th to the 13th year of age, but passed only four grades during this period. Late in September, 1913, after a period of depression, patient had a general convulsion and became violent. He was admitted to the Central Hospital on October 15, 1916. In the hospital he has shown the characteristic symptoms and signs of general paresis. Blood and spinal fluid gave a positive Wassermann reaction.

Much more frequently there is found an instability of movements which, at a distance, resembles chorea minor, but which has noth-

ing to do with that disease. This condition may be designated as choreiform instability. At times it appears even during rest, i. e., when the patients are making no violent efforts at movement. It is plainly noted that these movements are without motive as this or that extremity is seen to undergo these purposeless movements. Also the facial muscles are at times involved and this gives the impression of a peculiar grimacing. This instability is brought out more prominently when the patient is asked to remain absolutely quiet, e. g., extending the arms and spreading the fingers. Many cases find it impossible to remain quiet, as involuntarily various choreiform movements immediately appear.

A quite frequent motor symptom in the feeble-minded, especially the lower grades, is also the intention tremor, a tremor which accompanies volitional efforts, which during a relaxed state of the hand or an inactive position, as a quiet extension of the hand and separation of the fingers, disappears entirely. Some show inco-ordination in gait and in standing.

Kraepelin¹⁰ has called attention to the rocking movements of the body while seated or standing. Nodding of the head, clasping of the hands, and blowing and whistling movements as observed in the low-grade idiots are similar in many ways to the rhythmical movements of certain beasts of prey. It can thus be surmised that these movements are the expression of a lower arrangement of our nervous system, which through the loss of the higher control centres brings about their action.

CASE VI.

Case VI occurred in a male, age 54, who developed a Huntington's chorea.

History of intemperance of mother and father. Patient has been a convict in the State penitentiary for fifteen years and was an individual of rather low grade of mentality.

Examination.—August 8, 1916. Small, well nourished individual with full gray beard and gray hair. Eyes brown. Patient staggers about the room with his head drawn to the right and forward, with chin pointing to the left. He constantly maintains this attitude although the head is movable in all directions. The eyes are not deviated. He handles his arms and limbs clumsily, and reels like a drunken man about the room. He does not speak, but at times is said to utter a few unintelligible sounds. He does not cooperate and is inclined to be somewhat resistive. While sitting, there is an occasional shrugging movement of the left shoulder which has not the rapidity of a tic. He wrinkles the brows equally well. There is no ptosis or facial palsy. The pupils are round, central, equal and regular, react promptly to light direct and consensual and to accommodation. There is nystagmus. On forcibly opening the mouth the tongue was found to be in the median line. There is no atrophy. A glass of water is handed the patient; he grasps it clumsily, and brings it quickly to his mouth, throwing in the water and allowing the superfluous amount to run out. Swallows slowly with no apparent difficulty or choking. The muscle power in the upper and lower limbs is good. There is no tremor or atrophy. Patient moves his arms clumsily as though not knowing how to use them. He would not cooperate in finer tests for ataxia. Biceps, triceps and wrist jerks are present, active and equal. The patient moves his feet

clumsily. In walking slaps the heel to the floor. He does not reel in one direction any more than another. Achilles jerks and knee jerks active and equal. No patellar or ankle clonus, no Oppenheim or Babinski reflex. Cremasteric and umbilical reflexes present. He withdraws from painful stimulation. He is very untidy. He never talks, but at times makes a grunting noise. When food was brought the patient was sitting on the floor and the food was placed on the window sill. After several attempts he threw himself forward on all fours and then raised himself somewhat in the manner of a case of dystrophy, but did not place his hands on the lower limbs. After reeling about he reached the window sill and maintained himself with the right hand, while he reached for the food with the left. After several attempts he succeeded in picking up a slice of bread, and, keeping the arm tightly against the body, brought the forearm steadily against the mouth. After several attempts to grasp his cup he succeeded, and, without the arm being held against the body, he brought the cup steadily to his mouth, throwing the liquid into it, frequently choking before swallowing it. Babinski's catatonic attitudes of the cerebellar origin were not maintained. Patient is continually active and resistant.

Patient died April 11, 1917, and autopsy revealed the ordinary changes found in Huntington's chorea.

Disturbance in hearing is quite frequently found. Many deaf mutes are mentally normal. Only in about 30 percent is deaf mutism associated with weakmindedness. In severe hydrocephalic and meningitic cases deafness or a difficulty of hearing can be brought about in that the auditory nerve at the base of the brain may be involved in the lesion. Heightened sense of hearing is noted at times in the moron. It has been observed that inflammation of the tympanic cavity is much more frequent in the weak-minded than in the mentally normal. Reyto thinks that this may be due to the greater frequency of adenoid growths in the nasal pharynx. How the predisposition to adenoid growths is explained is as yet uncertain. It must be recognized that hereditary toxins and infections play their part.

Congenital absence of the visual system has been noted by Spiller,¹¹ in which nothing resembling the eyeball was seen and no part of the optic nerve or optic tract could be found. There was no sign of an external geniculate body on either side, and the thalamus on each side had nothing resembling an optic tract passing to it.

Disturbances in sight are particularly important because they are a marked impediment to the intellectual development of the weak-minded child.

The following chief forms are noted:

1. Retinal visual disturbances which depend upon a developmental anomaly or an inflammation of the retina. Here belongs for example, *retinitis pigmentosa* (pigmentary degeneration of the retina) in its primary congenital form. It is generally bilateral. At times it is familial in character, occurring in several brothers and sisters. Hereditary syphilis very likely leads to a

similar retinal change. Association with deaf mutism is not uncommon. There is no question relative to the fact that in the imbecile *retinitis pigmentosa* is much more frequent than in the mentally normal. Thus, for example, Wider¹² in forty-one cases of *retinitis pigmentosa* found twelve to be imbeciles.

A peculiar retinal inflammation which is found in families, is found in a special form of idiocy, a so-called amaurotic family idiocy.

2. Optic disturbances through lesions of the optic nerve. They are not very frequent. Generally there is an optic neuritis of meningitic origin. In severe *hydrocephalus internus* compression atrophy of the optic nerve can be brought about, I saw a case with Dr. E. C. Reyer in which the patient became totally blind within a period of nine months following a very large and extensive internal hydrocephalus. It is a question whether primary syphilitic optic atrophy occurs. Generally there is a residual, inflammatory gummatous process.

3. Optical disturbances through developmental defect or a degeneration process of the cortical optical sphere. These cases also are by no means frequent. Cortical blindness is especially infrequent in the ordinary form of congenital mental weakness. In a case reported by Meltzers¹³ there was a bilateral meningeal syphilitic process. It is characteristic on the contrary of cases under 1 and 2 that the ophthalmoscopic examination is normal and the pupillary action is retained.

4. Optical disturbances through interruption of the central optic tract. Occasionally in cerebral infantile palsy the lesion interrupts the optic tract. Thus we have a typical hemianopsia with a normal optic eye ground and normal pupillary reaction. It has not as yet been definitely ascertained whether in severe hydrocephalus there is an interruption of the optic tract through pressure.

It must be noted that the false designation of colors which is so frequent in the feeble-minded, is not as a rule due to a disturbance of color perception but to a defect in the memory pictures for colors.

CASE VII.

Case VII (Fig. 5) in a female,¹⁴ age 58, is one of syphilitic etiology. The patient was congenitally blind and deaf. She has been a public charge.

Patient has a saddle nose. Complete analgesia over the entire body. Very high and narrow palate. Irregular teeth. Carcinomatous development left breast. Autopsy revealed the cerebellum to be about two-thirds the normal size and on section showed atrophy. The skull presented osteosclerosis; the brain, chronic pachymeningitis, moderate chronic leptomeningitis, and cystic choroid plexuses. Weight of brain, 1,115 gms.

Wherever an examination is possible, disturbance in tactile sensibility is, as a rule, not found. In certain individual cases a decided hyperesthesia is found. It must be noted that the disturbances in

sensibility may be due wholly to disturbances in attention and judgment.

Pain sensibility is very frequently diminished or abolished. Some imbeciles do not react at all to the prick of the esthesiometer. In many cases pain sensibility is normal and occasionally heightened. It must be noted that analgesia and especially hypalgesia occasionally occur in individuals who are not weak-minded and occurs here as a sign of degeneration reaction.

Disturbance in position and movement perception is somewhat uncertain, and it is necessary to note whether this is not a mere apprehension disturbance.

Disturbance in ability to taste is quite infrequent. Disturbance in smell is likewise infrequent, and when present is generally due to complications, as adenoid growths, stenosis of the nasal passages, chronic rhinitis, etc.

According to Church and Peterson¹⁵ the organic sensations are always more or less disturbed. Visceral sensation is generally disturbed in idiots. The sensations of hunger and thirst are lessened, though very rarely absent. The sense of satiety after a hearty meal is seldom felt by them; so that if left to themselves they would eat on indefinitely. The necessity of defecation or micturition is not perceived at all by profound idiots.

A special form of idiocy is that dependent upon psychic deafness. According to Heubner¹⁶ these cases are characterized by the physical development being less impaired. The children learn to sit, to walk, etc., at the proper period. The sensations of sight, touch, and smell are present as also elementary auditory impressions. Echolalia has even been observed. The patients are unable to connect a concept with words and, since the acquisition of elementary as well as abstract conceptions are commonly dependent upon hearing, no mental life can develop in them.

Of far greater importance are convulsive attacks, which, next to coordination disturbance, represent the most important symptom in the motor field of the feeble-minded. Convulsive seizures of one type or another were present in 32.3 percent of the cases of idiocy, imbecility, and of the moron group.

The relation of epilepsy to feeble-mindedness is somewhat confusing at times. In many cases there is primarily an epilepsy, and the intelligence defect develops secondarily in consequence of the epilepsy, just as adult epilepsy brings about later a dementia. Such cases have nothing to do with feeble-mindedness, but belong to the epileptic dementia. In many other cases the intelligence defect and the epilepsy are coordinate symptoms, both being symptoms of a brain lesion, which lies at the basis of the feeble-mindedness. Finally individual cases of feeble-mindedness exist, in which it is evident during the disease course that the feeble-mindedness

is complicated with a genuine epilepsy. This is to be considered as more probable when, in an individual who has been feeble-minded as a child, epileptic attacks appear in later years and a progressive dementia ensues. Such cases were eliminated from this study.

Convulsive grinding of the teeth is at times noted in the feeble-minded, occurring while awake and also during sleep.

Peculiar irritation manifestations which are independent of the will are the abnormal flow of saliva which occurs in the lower grade idiots, and a tendency to vomiting, remastication, and rotation movements.

A not infrequent symptom is the so-called impulsive tic, which arises spontaneously and is not dependent upon an external stimulus. Thus an inflammation of the conjunctiva and of the eyeball may be caused by continuous blinking of the eyelids. There may be many other tics, as shrugging the shoulders, facial twitchings, etc. From outward appearances they simulate very much the above-described choreiform instability.

The following is a summary of the neuropathic manifestations most frequent in the three clinical types of the feeble-minded.

1. Idiocy. In idiocy the gross motor strength is almost always diminished. The inability to learn even simple coordination is noted in some cases. Hemiplegia is observed at times, which depends upon a complicating focal disease of the motor region, or of the pyramidal tract. Somewhat less frequently paraplegias and very rarely monoplegias are noted. The paralyzed limbs show, to a great extent, increase of tendon phenomena and contractions corresponding to the seat of paralysis. The atrophy is usually very striking, in contrast to the analogous paralysis of the adult. The growth of the paralyzed half of the body, and especially the bones, inclusive of the bones of the cranium and of the soft parts is also retarded. Flaccid paralyses are less frequent. Multiple paralysis of individual cranial nerves is also found; ocular paralysis being most frequent.

Incontinence of urine and feces exists quite frequently. This is not generally due to paralysis of the sphincters but is a consequence of the psychical condition. Epileptic attacks are extraordinarily frequent in idiocy. They are noted 32.3 percent of cases of feeble-mindedness and not infrequently they were present from the onset of the disease. Attacks of Jacksonian epilepsy are also noted, especially in cases with hemiplegic phenomena. Grinding of the teeth during sleep or while awake is frequently present as an isolated convulsive symptom.

Gross sensibility disturbances in general do not exist apart from a greater or less degree of hypalgesia. Only occasionally, are severe disturbances of sight and hearing noted. Complication with retinitis is found at times. Also disturbances of sight in consequence

of optic atrophy are noted. Deafness occurs in some cases. Taste and smell are generally moderately developed, and only at times is there a complete anosmia. The tendon phenomena are generally increased, especially in the already mentioned paralyses. In many cases they are normal, and less frequently they are lost. Abnormalities of secretion of saliva are quite frequently found in the idiot.

2. Imbecility. The neurological symptoms or manifestations observed in imbecility are generally the same as those of idiocy. The malformations, however, are, on the whole, not so numerous nor so pronounced. An essential difference is established by development of speech. The imbecile not only makes use of numerous words, but he combines his words into sentences. The articulation, however, is very often disturbed by stammering. In the normal child the stammering ceases, at the latest, at the age of four, while in the imbecile it is retained until the age of going to school, and often exists throughout the lifetime. The power of speech is almost always acquired very late. Many also learn to read and write very little. Strength coordination and movement, where complicated focal diseases do not exist, are generally intact. Epileptic insults in imbecility are also very frequent. Moreover motor and sensory disturbances are found as in idiocy, but generally less pronounced.

3. The moron. Frequently in the moron physical symptoms are absent throughout. In other words, one meets the same symptoms which are found in idiocy and imbecility. Generally, however, they are fewer in number and less pronounced. Speech is generally intact. Epileptic attacks are also frequently found in the moron.

For the methods employed in such researches as those embodied in this paper, I am greatly indebted to Prof. Th. Ziehen. The suggestions which I received while his student and those which have been given by him in personal correspondence have been very helpful. I am indebted to Drs. Frederick C. Potter and E. D. Martin for the Wassermann tests and autopsy findings.

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FOREIGN BODIES IN THE BRONCHI.*

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I. TWO UNUSUAL BRONCHOSCOPIC CASES, WITH SPECIAL INSTRUMENTS USED IN EXTRACTION.

The following bronchoscopic cases present some unusual features, both in the nature of the foreign bodies and in the methods of their extraction.

CASE I. STEEL-JACKETED BULLET IN THE LEFT BRONCHUS.

During the mobilization of troops in the summer of 1916, Edward R., aged six years, was given a United States rifle cartridge for a toy. The steel-jacketed bullet came out of its shell and, on July 7, 1916, while he was playing with the bullet in his mouth, it slipped down his throat.

On the advice of his family physician he was brought to the Cincinnati General Hospital three days later.

Physical Examination.—A physical examination showed increased expansion and hyper-resonance over the right chest. The left chest showed impaired expansion and diminished resonance, with breath sounds absent, except in the apex region. The heart was transposed to the left, with the apex beat in the fifth interspace 2.5 cm. from the nipple line.

A roentgenogram showed the bullet point downward in the left bronchus. The left lung gave a very dense shadow and the heart was transposed to the left (Fig. 1).

Operation.—July 10, 1916, morphia gr. 1/8 and atropine gr. 1/200 were given, and ether followed by chloroform was administered. An 8.5 cm. Kahler bronchoscope was introduced through the mouth, and the foreign body was found firmly impacted in the left bronchus. With the ordinary forceps which I had available I was unable to grasp the foreign body, so that I finally employed a flexible forceps (Fig. 2), which I had designed for another purpose. Aided largely by touch imparted through this flexible forceps, the bullet was grasped by the blunt end and withdrawn with the bronchoscope. It was 25 mm. long and 7 mm. wide (Fig. 5, A).

After operation the patient was slightly hoarse and showed evidence of a severe bronchitis, but within a week was discharged in good condition.

*Read before Middle Section of American Laryngological, Rhinological, and Otological Society, Columbus, Ohio, February 26, 1917.

CASE II.

UMBRELLA FERRULE IN THE RIGHT BRONCHUS.

Carlos H., aged 12 years, was admitted to the Cincinnati General Hospital on January 4, 1917. He stated that on the afternoon

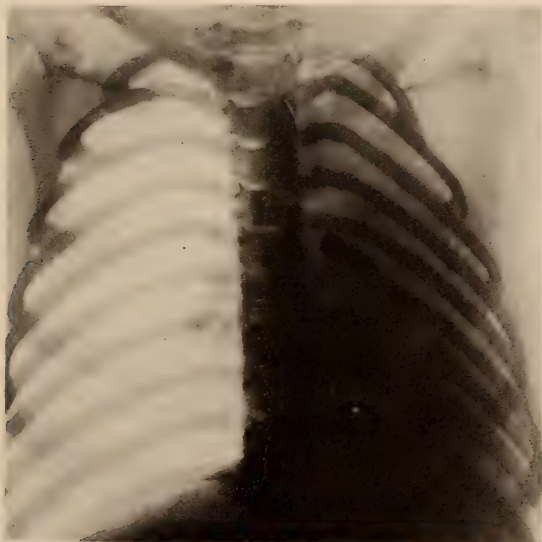


Fig. 1.—Roentgenogram showing bullet in left bronchus.

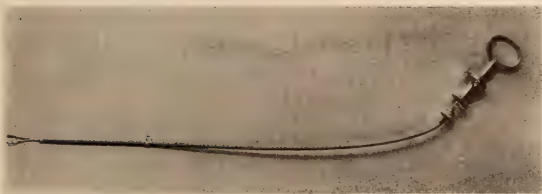


Fig. 2.—Flexible forceps with which bullet was extracted through a bronchoscope.

of the same day, while he was standing on the edge of the curb-stone with what he thought at that time was a small brass bell between his teeth, his small brother came up behind him and gave him a push and threw him off the curb. As he left the curb he

gave a gulp and "swallowed" the bell. He at once had pain in his right chest, and he had difficulty in breathing. He was rushed to the Cincinnati General Hospital, though at this time he suffered very little pain except when he took a deep breath.

Physical Examination.—The patient was at once taken to the x-ray room, and the fluoroscope showed a thimble-shaped object in the right bronchus, about two inches below the bifurcation. (The

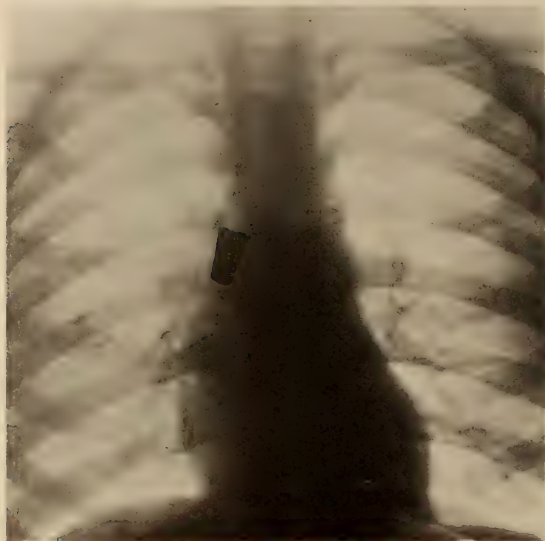


Fig. 3.—Roentgenogram showing umbrella ferrule in right bronchus.

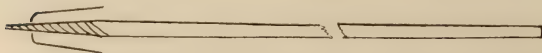


Fig. 4.—Illustrating bolt and nut principle of extraction of the ferrule.

child was also given a glass of bismuth mixture to drink and the fluid could be seen passing down behind the object.) An x-ray plate was made at the same time showing the foreign body well down in the right bronchus (Fig. 3). The respiratory expansion over the right side was not as marked as over the left. On percussion no areas of dullness could be found. Auscultation revealed breath sounds in both lungs but more feeble in the right, which led to the conclusion that the foreign body either had a hole in it or that

there was a by-pass for the air. During auscultation the patient was shaken by the interne, but no tinkling sound could be elicited, but on questioning the patient he informed me that the bell had no clapper.

Operation.—January 4, 1917, under chloroform drop anesthesia, a Kahler bronchoscope was passed, and a thimble-like body, with its wide end uppermost, was located firmly impacted in the right bronchus. A small hole, apparently 1/16 inch in diameter, through which the air bubbled, could be seen in the distal end of the foreign body. Forceps of various kinds were repeatedly applied to the free edge of the foreign body, but they all slipped off, since traction seemed to tilt the foreign body and draw its sharp edge into the opposite bronchial wall. The end of a hooked probe was introduced through the hole in the "bell" and, at one time, I thought the foreign body had dropped into the pharynx as the bronchoscope was being withdrawn. To determine the exact position of the foreign body, the patient was then taken to the x-ray room, but the fluoroscope showed the foreign body in its original position. Upon returning to the operating room, a Jackson tube was passed without further anesthesia, but the forceps slipped as before.

At one time the child ceased breathing and a tracheotomy was begun, but the child reacted as the skin was cut. The operation was discontinued at this time, pending the manufacture of a special extractor. This was made on the following day according to my design, and consisted of a long brass rod with a tapering screw thread at one end which was intended to be screwed into the hole in the end of the foreign body on the principle of a bolt and nut (Fig. 4).

Second Operation.—January 5, 1917. Since I feared from my previous experience with the case that the foreign body might become dislodged and fixed crosswise at the tracheal bifurcation or that it might strip off below the vocal cords I had determined on a preliminary tracheotomy through which I could better meet or obviate this accident. Furthermore, I did not wish to repeat a general anesthetic.

Under local anesthesia a low tracheotomy was made through which a short (9 mm. Jackson bronchoscope was introduced and the foreign body located. Dr. Merrick McCarthy, who was assisting me, then screwed the special extractor into the hole in the foreign body which was easily withdrawn with the bronchoscope until the tracheal opening was reached, when it was stripped off. I immediately seized it with a forceps and extracted it. It proved to be a brass umbrella ferrule (Fig. 5, B) 15 mm. long and 10 mm. in its widest diameter.

Comment.—These cases illustrate certain features of foreign bodies in the bronchi. In the first place physicians and laymen

realize that foreign bodies can readily be removed and patients are no longer neglected, but are more frequently sent to clinics and hospitals.

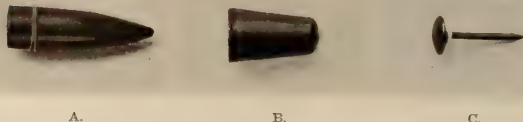


Fig. 5.—A, bullet, actual size, removed from bronchus (Fig. 1). B, umbrella ferrule, actual size, removed from bronchus (Fig. 3). C, upholstery tack, actual size, spontaneously expelled from bronchus.

The physical findings and roentgenograms were characteristic in the first case for complete obstruction of a bronchus, while in the second, although the foreign body was a large one, a by-pass for air could be diagnosed. The necessity for improvising instruments to meet unusual conditions is especially well demonstrated in Case II. I find that Richardson¹ devised an instrument resembling a cork-screw to remove a rubber eraser which plugged a bronchus, while the instrument which I employed may be likened to a bolt and nut. The use of a flexible forceps has some advantages when the tactile sense is employed in extraction, since there is but slight danger of traumatizing the tissues with such an instrument. Although Jackson's contention is correct, that foreign bodies should be seized under ocular guidance, still in exceptional cases especially with proximally lighted tubes we must also depend to some degree upon touch as well.

II. SPONTANEOUS EXPULSION OF AN UPHOLSTERY TACK FROM THE RIGHT BRONCHUS.

On the afternoon of September 6, 1914, while playing with an upholstery tack, a little girl, V. R., aged six years, lost the tack in a piece of cloth and in shaking out the cloth the tack dropped into her mouth. She was immediately seized with violent coughing fits. Those about her inverted her and attempted to dislodge the foreign body.

Dr. Charles Heisel was called a short time thereafter, and he also attempted inversion, but found that this increased the coughing. At my suggestion (telephone) the patient was taken at once to the Jewish Hospital and Dr. S. Lange made a roentgenogram which showed the tack lodged head-downward in the right bronchus, opposite the fourth rib posteriorly.

On examination there was slight coughing but no dyspnea. Impaired resonance and feeble breath sounds were found over the base of the right lung with squeaking rales chiefly on the right

side. The child was given 1/200 grain of atropine and sent to the operating room. Before the anesthesia was administered I found that the most suitable forceps for the case was out of order. I therefore decided to postpone the bronchoscopy until 8 o'clock the same evening.

A short time after I had left the hospital, the interne, Dr. F. Goldenberg, telephoned me that the child had coughed up the tack. It measured 18 mm. in length and the head was 7 mm. in diameter (Fig. 5, C).

Comment.—Unfortunately, I have been unable to find the x-ray plate of this case, which proves to be a rather important one, since Jackson² in his recent book states that a foreign body of this kind has never been expelled spontaneously.

From the increased coughing on inversion we may assume that the tack was at first free in the air passages. Additional factors favoring spontaneous expulsion were the short sojourn (three to four hours) of the foreign body, the rest in bed; the administration of atropine which possibly relieved the spasm of the bronchus, which had been manifested by the squeaking rales and finally the tack proved to have but a moderately sharp point.

The manner of entrance as well as exit of this foreign body was certainly out of the ordinary!

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RADIUM VERSUS SURGERY—SOME COMPARISONS.

By C. W. HANFORD, M. D., Chicago, Ill.

In the treatment of malignancy by surgery the preservation of healthy tissue in the process of eliminating the lawless cancer cells has not in the past been considered. The one aim has been to cut deep enough and wide enough to include all cancer cell nests.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

As a result of this radicalism, when the lip, nose, cheek, or immediate neighborhood of the eye are involved, the resulting scar is very unsightly, and, while the patient is very glad to be rid of the malignant growth, even if the mouth or eyelid should be drawn out of shape, yet it would be much more gratifying to all concerned

if the malignancy could be obliterated without disturbing the cosmetic effect, except to a very slight degree.

As an illustration will always explain a point much more satisfactorily than pages of print, I have employed photographs and schematic drawings to make clear my points.

Fig. 1 in the following group shown is illustrative of the usual run of epitheliomas. Fig. 2 shows the site of the growth after radium had been applied at various times over a period of six weeks. Fig. 3 (schematic drawing) shows the line of incision the surgeon would employ in an effort to eradicate the disease. Fig. 4 (schematic drawing) is not an exaggeration of the resulting, unsightly scar following such operations.

In this case the growth was very rapid. The patient described its commencement as a "cold sore," and as such it was treated for



Fig. 5.



Fig. 6.

a short time. Finally medical aid was sought, but applications and x-ray produced no effect whatever.

The second case shown (Fig. 5, 6) presents an epithelioma at the corner of the mouth, with a hard, indurated ulcer on the mucous surface. This case was of five years' standing, and had been treated with various medicaments. As it was beginning to increase in size and was causing some pain, the patient was referred to me by her physician, Dr. McGinnis, of Joliet. She received in all three applications with a flat radium applicator and one treatment with a tube held in the corner of the mouth. There is now not the slightest sign of the former lesion.

I have not presented a schematic drawing in this case to show the line of incision that would have been followed by the surgeon, as the reader can readily picture in his mind's eye the amount of tissue the surgeon would remove to totally destroy the growth.

These cases are not at all spectacular, and are presented simply to demonstrate to the skeptics that, with radium available, there is often no need to mutilate a patient's face in order to secure a definite and perfect healing.

MORPHINE IN PERITONITIS.

By R. J. BEHAN, M. D., Dr. Med. (Berlin), Pittsburg, Pa.

Recently there has been a renewal of the discussion in regard to the administration of morphine in peritonitis. It has been recommended indiscriminately in all stages of this disease. Some surgeons give it constantly and consistently while others reserve its administration for certain definite conditions which are present in the course of a peritonitis. That morphine has properties which may be classed as virtues is undoubted, judging from the number and the eminence of its advocates. Yet the very eminence and standing of these advocates is apt to influence the less eminent practitioner into false and distressing therapy. The busy worker hears of morphine as a panacea in peritonitis, and he gives it in every case, without regard to the existing pathology, and careless of the contraindications to its administration.

It is the busy doctor who needs to review carefully the etiology, pathology and course of peritonitis, and the influence of morphine on peritonitic processes.

Peritonitis arises from many causes but it makes no difference what the origin, the primitive cause is as a rule some bacterial organism. There may exist a peritonitis of non-bacterial origin, but the peritonitis with which we are most concerned is due to bacteria. These bacteria gain entrance to the peritoneal cavity as a rule from appendicitis, cholecystitis, a salpingitis, a ruptured gastric or duodenal ulcer or the rupture of some hollow viscus, or as the result of traumatism.

In every instance, if the patient is seen at the very beginning of the disease, morphine should be exhibited in order to inhibit peristalsis so that the quiescent intestine may offer more opportunity for the formation of protective and life-saving adhesions. If the intestine is quiet, as is determined by the absence of peristalsis when the abdomen is auscultated, morphine no longer should be given. The danger now is that the paralysis may ensue and become permanent, leading to great distention and angulation of the bowel. To counteract against the occurrence of this most disagreeable complication it is necessary to give some intestinal muscle excito-contractor, such as pituitrin or eserine.

Pituitrin is best because it stimulates the intestine to a tonic contraction, while eserine stimulates the rhythmic peristaltic movement, and in early and active cases of peritonitis should not be used. Morphine with pituitrin may in such cases be exhibited.

A localized peritonitis which is becoming more diffuse is favorably influenced by morphine. However, at best it is difficult to determine correctly whether a peritonitis is definitely localized or is gradually extending. Percussion may greatly help us. It is my custom to percuss carefully the abdomen in every case of peritonitis. I find in local peritonitis, for instance in that due to periappendicular abscess, I can define a less resonant note over the involved intestine than over the adjacent bowel. This changes to a less and less resonant note (higher pitch) as I come over the area of greater inflammation, and as I go further and percuss over the abscess the note is very high. The reason for the change in pitch is that the intestinal walls in the involved inflammatory area gradually become infiltrated, and, elasticity being lost, they do not vibrate so markedly as does the involved intestine; consequently they give a higher pitched note on percussion. The spread or retrocession of this area of higher pitch indicates the extension of retrogression of the disease.

If our examination discloses that the disease is progressing and peristalsis is still present in the involved and adjacent areas, morphine is indicated. If in the disease area peristalsis is absent and is not active in the adjacent surrounding zone, morphine is not indicated. The only occasion to use morphine, then, would be to quiet a restless and suffering patient.

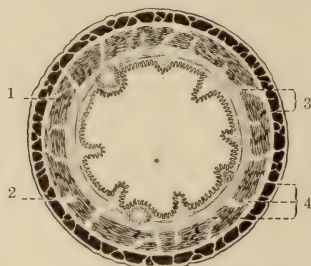
If the process begins to retrogress, which is indicated by the area of dullness receding, the pulse becoming less rapid, the temperature dropping, and the patient beginning again to use the diaphragm in respiration, morphine should not be given, because in this stage there is but a very small margin of safety between the contracted and the paralyzed bowel. If the bowel once loses its tone it begins rapidly to dilate until it reaches such a degree of distention that no drug will have any influence upon it. When this begins the only salvation for the patient lies in the speedy exhibition of powerful intestinal stimulating drugs or in an enterostomy. If the obstruction is mechanical, which is most likely to occur late in the disease or in the recovery stage, then the use of morphine can only do a positive injury.

Morphine seems to be indicated then in the very early stages of peritonitis, either localized or general, in localized peritonitis which is spreading, in a stationary peritonitis which in the involved area shows marked peristalsis, and in a patient who because of pain, etc., does not have sufficient rest, and in one who is irritable.

In order to better understand the therapeutics of morphine as applied to the intestine I have presented a rough sketch.

The morphine inhibits impulses and reflexes from the serous coat, the first structure involved in peritonitis; as a consequence the respirations become deeper and less rapid. This is probably more

of a disadvantage than an advantage. The only time such an action may be of value it would seem, is when because of the rapid and inefficient respirations the patient is not receiving sufficient oxygen as is indicated by his cyanosis and increased CO_2 content in the blood. In this respect morphine may be of value in the cases of general peritonitis with extremely rapid respiration. It has been shown by Henderson that CO_2 increases peristalsis, therefore anything which would reduce the CO_2 content in the blood would reduce peristalsis and aid to a certain extent in adhesion formations.



Diagrammatic cross-section of small intestine.

- 1.—External longitudinal muscular layer, supplied by the vagus. Stimulation produces pendulum peristaltic movement. Atropine inhibits external longitudinal layer, morphine stimulates external longitudinal layer, and pituitrin stimulates external longitudinal layer.
- 2.—Internal circular muscular layer, supplied by Auerbach's plexus. Nicotine stimulates, atropine in small doses stimulates, atropine in large doses paralyzes, and strychnine and pituitrin stimulate.
- 3.—Vagus stimulates peristalsis. Morphine and atropine inhibit vagus, and physostigmine and pilocarpine stimulate vagus.
- 4.—Sympathetic inhibits peristalsis. Morphine, adrenalin, and nicotine stimulate the sympathetic. Morphine in ordinary doses stimulates the intestinal muscle directly, and therefore increases the bowel contraction (tonus).

In this early stage of peritonitis morphine does however relieve the pain, and thus conserves the patient's energy and strength for the greater struggle which is to come.

In its action on the muscle of the intestine we note the following: In small doses it has a stimulating action on the longitudinal fibers of the intestine, which seem to be the cause of the large wavelike contractions passing down from above. It is this wavelike forward propulsive movement that is so prone to spread infection from one area to another, the very thing which it should be the endeavor to avoid. Morphine stimulates the sympathetic which inhibits all movements, and when given in large doses it inhibits this peristaltic action. Atropine seems to be the very drug which is the most useful as an adjuvant to morphine. Morphine paralyzes the vagus but stimulates the muscle of the intestine. Atropine at the same time inhibits the vagus, inhibits

the longitudinal muscle layer and stimulates the circular layer so that the intestine is held in a tonic state. If these two drugs are combined with pituitrin, bowel peristaltic movements are inhibited, while the contraction of the circular fibres are stimulated so that the bowel is held in a state of tonic spasm. This action of the pituitrin is upon the muscle alone so that is not interfered with by nerve paralysis. Strychnine is also useful for the reason that it acts directly and alone on Auerbach's plexus.

THE ROENTGEN RAY IN DIAGNOSIS OF GASTRO-INTESTINAL DISEASE.

By MAXIMILIAN JOHN HUBENY, M. D.,

Consulting Roentgenologist to Municipal Tuberculosis Sanatorium, Henrotin Hospital, German Hospital, and Chicago Polyclinic Hospital, Chicago.

The clinical value of the roentgen ray in the diagnosis of gastro-intestinal diseases has now become widely recognized. Twenty years ago Cannon, of Boston, first used bismuth subnitrate in food to study the living stomach of the cat, and it is eighteen years since Williams, of Boston, delineated the human stomach by the use of the same salt. Since then the development of apparatus, the stimulation of this method of examination, and the corroborative surgical and pathological check-ups have definitely placed roentgenology in the horizon of gastrointestinal diagnostics.

The technic involves the administration of an opaque salt, either bismuth subcarbonate, bismuth subnitrate, or preferably barium sulphate, in definite quantities and in certain media, usually malted milk or buttermilk, or a glass of each. The patient should be examined roentgenoscopically and roentgenographically. This should be done in the standing and lying postures and from different angles. Some roentgenologists confine themselves more particularly to the fluoroscopic examination; however, the method so heartily advocated by Cole is being used more and more, and rightfully so, for graphic reproduction enables us to distinguish delineations that are incapable of perception by the eye when using the fluoroscope alone. Stinting in the use of plates is an injustice to the patient and to the profession of roentgenology, for error is allowed to creep in with disastrous results.

The literature on gastric ulcers is virtually limited to a description of hour-glass stomach, Haudeks' niche, and roentgen signs and symptom complexes. The last are of comparatively little value by themselves, because they are inferential, or, as classed by some, "indirect."

Holzknacht and his two renowned assistants, Jonas and Haudek, have compiled a series of tables of symptom complexes embodying mature conclusions derived from inductive reasoning based on a large experience.

SYMPTOM COMPLEX I.

1. Stomach empty after six hours. Head of the bismuth column in ascending colon.
2. Stomach shadow normal.

3. No increased peristalsis. No antiperistalsis.
4. No sensitive pressure point.
5. Hydrochloric acid normal.

Diagnosis.—Normal stomach.

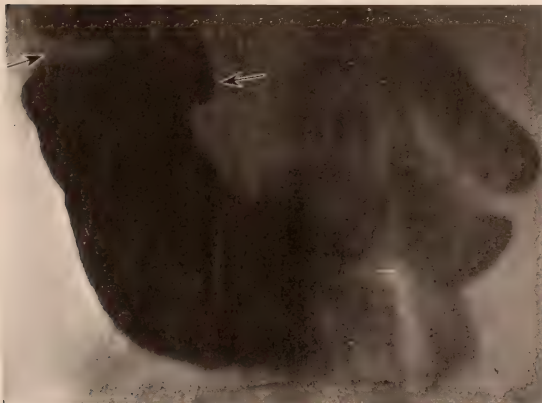


Fig. 1.—Haudek's niche, with spasm on greater curvature.



Fig. 2.—Arrow head indicates location of ulcer. Hyperperistalsis present.

SYMPTOM COMPLEX II.

1. Small residue after six hours.
2. Sensitive pressure point over the stomach.
3. Normal stomach shadow.

Diagnosis.—Simple gastric ulcer. Other symptoms confirming

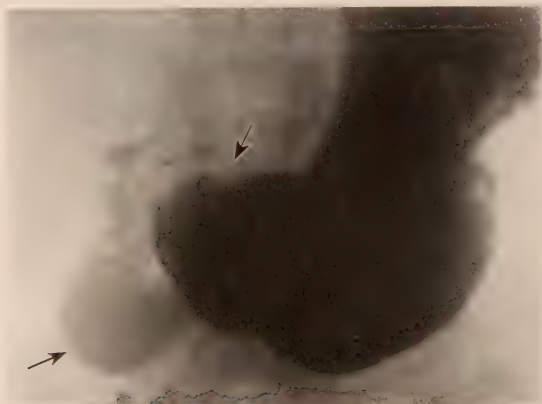


Fig. 3.—Pyloric ulcer, with extensive adhesions extending to and involving the duodenum, with consequent dilatation of the latter.



Fig. 4. Marked induration along lesser curvature. Gastric ulcer.

this diagnosis are: antiperistalsis, displacement of the pylorus upward and to the left, snail form of the lesser curvature, stable transverse contraction, changing transverse contraction.

SYMPTOM COMPLEX III.

1. Small bismuth residue after six hours.
2. Pressure point.
3. Displacement upward and to the left.
4. Snail form of the stomach.

Diagnosis.—Old contracting ulcer on the lesser curvature of the *pars pylorica*.



Fig. 5.—Gastric ulcer, with marked induration.

SYMPTOM COMPLEX IV.

1. Small bismuth residue after six hours.
2. Pressure point and resistance in the *pars media*.
3. Transverse contraction of the *pars media*.
4. Diverticulum without air bubble in the smaller curvature; immovable.

Diagnosis.—Callous ulcer of the *pars media*.

SYMPTOM COMPLEX V.

1. Large sickle-shaped bismuth residue after six hours.
2. Dilatation.
3. Loss of tone.

Diagnosis.—Old stenosis of the pylorus, due to ulcer.

SYMPTOM COMPLEX VI.

1. Stomach empty in six hours. Head of bismuth column in the ascending colon.

2. Stomach shadow normal.

3. Pressure point moving with the duodenum.

Diagnosis.—Ulcer of the duodenum.

This method is subject to some friendly criticism, because the conclusions are, to a great extent, inferential. When, however, we have associated visual alterations in contour, due to spasms, indurations, new growths, or adhesions, we are justified in definitely stating the presence of a pathologic condition. Inferential evi-



Fig. 6.—Adhesions involving greater curvature, producing marked filling defect. Postoperative, following gastrojejunostomy.

dences, unless life is involved, should not be decisive in the institution of surgical interference.

Haudek's niche, when present, is conclusive evidence of gastric ulcer. In this we get the accumulation of the opaque meal, which has emerged through a penetrating ulcer and been walled off in a pouch on the lesser curvature or posterior wall of the stomach. With the patient in the upright position the opaque meal gravitates to the bottom of the pouch and is usually surmounted by a gas bubble.

The hour-glass deformity due to cicatricial contraction of an old ulcer is so characteristic that little error is possible; it must, however, be differentiated from spasmodic hour-glass or an unusually deep peristaltic contraction. The association of painful pressure

points with abnormal contours is highly suggestive. This is particularly true with certain spasms. Care must be used to differentiate between spasm due to gastric ulcer, duodenal ulcer, pancreatic involvement, cholecystitis, and appendicitis.



Fig. 7.—Marked cap deformity.

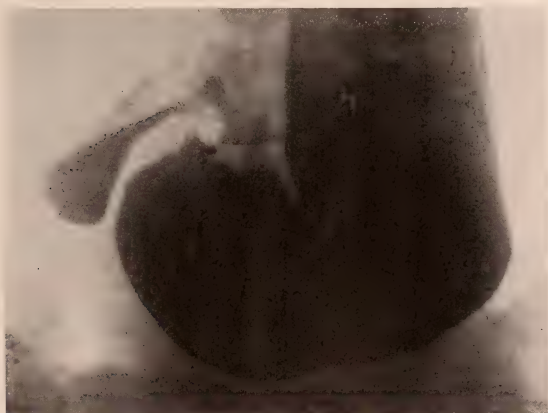


Fig. 8.—Duodenal ulcer, with adhesions.

According to Carmen, three forms of spasm due to gastric ulcer may be recognized; first, the hour-glass stomach; second, diffuse

spastic distortion; third, spasm of the pyloric sphincter. In indurated gastric ulcer careful examination, particularly by the plate method, will often reveal permanent indentations and impaired local peristalsis.

Duodenal ulcer offers a more fruitful field than gastric ulcer. Normally the bulbar cap is clean cut, well defined, regular in outline, and inclined toward symmetry. It appears to be continuous with the pylorus, being separated from it by the sphincter demarcation; the sulcus thus formed is about one-fourth inch wide. Here again the fluoroscopic and plate methods should be used; in this instance, in my opinion, the serial plate examination greatly excels



Fig. 3—Duodenum pulled toward region of gall-bladder, due to adhesions following chronic cholecystitis.

the fluoroscopic examination. Serial radiography is becoming the method in which most reliance is to be placed. The value of fluoroscopy should not be minimized, and it must always be used jointly with the serial plate method.

The duodenum is most readily visualized by having the patient lie on the right side, then suddenly turn on his back, at which time pressure is exerted at the duodenojejunal angle, thereby incarcerating its contents; at the same time the gastric contents should be forced toward the pylorus. (Case.)

Characteristic findings of duodenal ulcers are distortions of the *bulbus duodeni*. Occasionally cap deformities, as observed roentgenologically, far exceed the pathologic evidences as determined by surgery, and therefore the supposition is that intrinsic spasms

of the caput occur similar to gastric spasma associated with gastric ulcer.

The usual types of deformity are: first, niche-like cavities. Here we have the excavation of the ulcer visualized as a barium-filled recess. The size may vary from that of a wheat grain to the size of a pea. Spastic incisura may or may not be present. Second, a bulbar shadow represented by a small compact shadow, with no especial regularity of contour. Occasionally a steer horn (hypertonic) stomach may normally show a similar cap. In some instances there is a scant exit of barium through the pylorus, or rapid duodenal clearance. When due to obstructing ulcer, we get hyper-



Fig. 10.—Peristaltic incisura of caput. A rare phenomenon.

peristalsis, antral dilatation, and six-hour residue. Third, incisura may be present, either single or bilateral; usually small, sharply outlined, and occurring in the plane of the ulcer. Fourth, general distortions, with sharply outlined projections and incisura-like indentations, giving the cap the appearance of finger-like arborizations. This deformity is largely organic; if partly due to spasm, the latter element is unvarying and persistent. In many cases the whole contour is deformed; in some, only one border or the base is decidedly irregular.

The above-mentioned types are direct evidences of duodenal ulcer and are conclusive.

The indirect findings, such as (a) gastric hypertonus, hyperperistalsis, and hypermotility, (b) six-hour gastric residue, (c)



Fig. 11.—See Fig. 12 for delineation.



Fig. 12.—Carcinoma of head of pancreas, extending to and involving stomach and duodenum. Delineated engraving of Fig. 11.



Fig. 13.—Indurated area following chronic duodenal ulcer.

dilatation of *antrum pylori*, (d) gastro-spasm, (e) duodenal diverticulum, are strong corroborative evidences of ulcer.

Hypertonus may be due to a spastic increase of tone, or to an attempt to compensate for a beginning stenosis.

Hyperperistalsis is present in about 60 percent of cases, although sometimes seen in gallbladder disease or appendiceal involvement.

Hypermotility is the logical result of hypertonus and hyperperistalsis, and, when this triad is present, ulcer is strongly suggested. Hypermotility is also found in gastric cancer, achylia, and the diarrheas.

A six-hour gastric residue without unbroken outline should first suggest duodenal obstruction, secondary to duodenal ulcer. If with this we get hyperperistalsis, the diagnosis is almost certain.

Dilatation of the antrum is a late manifestation, and should suggest an obstructive lesion.

Gastric spasms, such as migratory incisura or spastic hour-glass contractions, are merely inferential.

Diverticulas are usually false; they result from a perforated ulcer and excavation of adjacent tissue. True diverticulas are relatively rare. Both types are capable of recognition.

The value of the above indirect, or, more properly designated, inferential signs depends on their relative association, persistence, and harmonious blending, correlated with the essential clinical data. The latter is quite desirable, for no one method should be neglected in ascertaining a correct diagnosis.

THE DIFFERENTIAL DIAGNOSIS OF RIGHT RENAL AND GALL-BLADDER LITHIASIS.

By LEWIS GREGORY COLE, M. D.,

Professor of Roentgenology, Cornell University Medical College.

It is a well-known fact that biliary calculi may be misinterpreted as renal calculi in the examination of roentgenograms of the upper right quadrant of the abdomen. This fact was forcibly impressed on me twelve years ago, when I made an erroneous diagnosis of renal calculus in a case having a calcified gall-stone.

The importance of the differentiation of these calculi has not been sufficiently emphasized. And it is a most embarrassing complication for the surgeon when an effort is made to find and remove a renal stone that does not exist and which in reality is a gall-stone, that cannot be reached through a kidney incision. The reverse of this situation is equally embarrassing.

In an article on the detection of renal stones published in 1908 I mentioned gall-stones as one of seventeen things which might be misinterpreted for renal stones, and in 1914 I published an article on gall-stones in which I called attention to the necessity for differentiating gall-stones from kidney stones, and gave some of the differentiating characteristics of the two conditions.

While we recognize, at the present time, that a high percentage of even soft cholesterin gall-stones can be detected by carefully made roentgen examinations, there is only approximately 20 percent of gall-stones that have sufficient density to cast shadows on plates made of the right kidney; that is, with the tube anterior and the plate posterior. In approximately 5 or 6 percent of gall-stones the calcium deposit may be sufficiently extensive or so uniformly distributed that the differentiation from renal stones may be difficult; yet this situation does arise with sufficient frequency to require that one always be careful to differentiate every case of right renal calculus from gall-stones.

As a proof that this differentiation is sometimes perplexing, I shall show two plates, one of which is renal calculus, and one of which is gall-stone, and without differentiating them for you, I shall allow you to form your own conclusions as to which is gall-stone and which is renal stone (Fig. 1, 2).

There appears to be a well-disseminated belief that gall-stones do not acquire the marked density assumed by renal stones. A roentgenologist of experience recently, after looking at some plates, remarked to me, "Oh! that can't be a gall-stone; it has the density



Fig. 1.—Which is it?



Fig. 2.—Which is it?

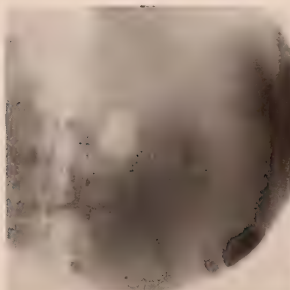


Fig. 3.—Renal calculus.

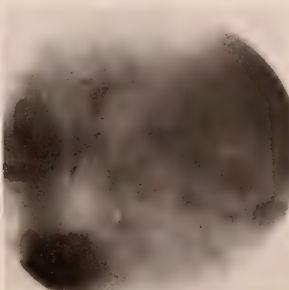


Fig. 4.—Biliary calculus.

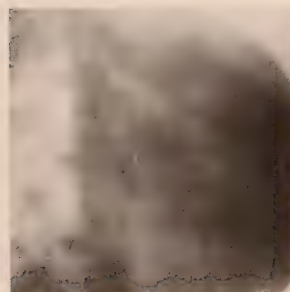


Fig. 5.—Renal calculus.

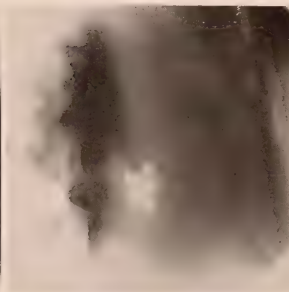


Fig. 6. Biliary calculi.

of a bullet." If in the beginning we would discard this fallacious belief, we should undoubtedly prevent some erroneous diagnoses.

As I have stated in a previous paragraph, there is, relatively speaking, only a small percentage of stones where the differentiation is difficult, and I am convinced that in the majority of instances the use of a little mature deliberation with carefully made plates is all that is necessary for one to arrive at a correct diagnosis. I shall consume no time in this paper in a discussion of the proper tube or plate technic to be used in properly made gall-bladder or kidney plates, but I must dwell on this point long enough to say that, if this part of the examination is properly cared for and one has clean, sharp, crisp plates to interpret, many differentiations that appear to be difficult become simple.

In the following tabulation I shall attempt to give you the general comparative physical characteristics of gall-stones and kidney stones—these characteristics being based on the physical properties of all types of stones as they are observed and interpreted in well made plates.

1. Renal calculi are usually very dense. Biliary calculi may be either soft or dense (Fig. 3, 4).

2. Renal calculi are usually single. Biliary calculi are usually multiple (Fig. 5, 6).

3. Renal calculi usually are of the same density throughout. Biliary calculi usually have a variable density, many times showing only a ring-like shadow or a dense nucleus (Fig. 7, 16).

4. Multiple renal calculi usually have an irregular shape, the size and shape conforming to the pelvis or calices. Multiple biliary calculi, when they fill the gall-bladder, usually conform to the pear-shaped gall-bladder (Fig. 8, 9).

5. Multiple renal calculi usually vary in size and shape. Multiple biliary calculi usually have relatively the same size and shape (Fig. 10, 11).

6. In renal calculi the surfaces are usually rounded. In biliary calculi the surfaces are usually faceted (Fig. 12, 13).

7. Renal calculi frequently are branching with irregularities conforming to the pelvis and calices. Biliary calculi are never branching, but do occasionally have flat surfaces (Fig. 10, 14).

8. Renal calculi seldom change their position between examinations. Biliary calculi frequently change their position between examinations (Fig. 15, 16).

I shall now present some of that small group of troublesome situations where the differentiation of the two conditions is most difficult, and where the differentiation cannot be made from the physical characteristics. Subsequently I shall show how these can be differentiated.

Occasionally when an examination of the right kidney is made

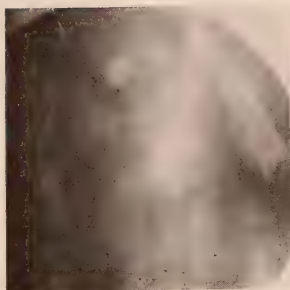


Fig. 7.—Renal calculi.



Fig. 8.—Renal calculi.



Fig. 9.—Biliary calculi.



Fig. 10.—Renal calculi.

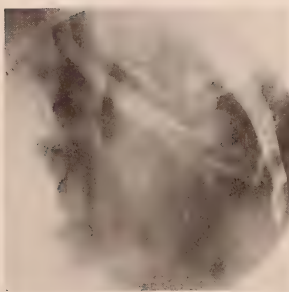


Fig. 11.—Biliary calculi.

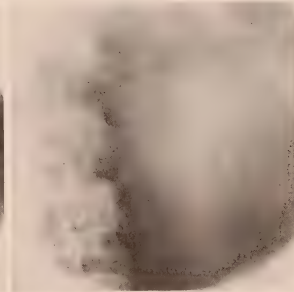


Fig. 12.—Renal calculi.

and the kidney outline is distinctly shown, there will appear within the kidney shadow a sharply defined, rounded calculus, casting a uniformly dense shadow of relatively small size (Fig. 17). Naturally one would be prone to make a diagnosis of renal calculus without much hesitation when confronted with such a striking picture, but this is where careful differentiation many times saves an embarrassing situation. I have only recently seen such a case where a diagnosis of renal calculus was made by another roentgenologist, and the diagnosis was subsequently established as gall-stone. Fortunately this patient was not operated before the correct diagnosis was established.

The reverse of the foregoing example might just as readily happen. One may get good, crisp plates showing a sharply defined gall-bladder, and lying within this shadow the same type of dense, rounded calculus may be observed. Again, one must be careful to assure himself that this is not a renal stone (Fig. 19). Another difficult differentiation to make is in the case of multiple small, rounded, uniformly dense stones lying within the kidney shadow on kidney plates and within the gall-bladder shadow on gall-bladder plates; these stones may even change their positions relative to each other between examinations. One would be very prone to say that these were gall-stones, but I have such a case where the stones were renal and were freely movable in the pelvis of a hydronephrotic kidney.

The most difficult differentiation that I have ever been called on to make is where the stone was lying posteriorly in the cystic duct and yet superimposed over both the normal kidney and gall-bladder region (Fig. 18). This stone was exceedingly difficult to differentiate by most of the methods which I shall enumerate.

The foregoing are good illustrations of the unusual and difficult situations, and should serve to impress on you the necessity for guarded, cautious opinions. It is impossible to differentiate such stones as I have just described by their physical characteristics because their physical characteristics are identical. The only certain method of differentiation lies in determining their anatomical location. This is done by determining the proximity of the stone to either the anterior or posterior abdominal wall. The methods by which this information is determined are found in the realm of refined roentgen technic; and unless this technic is followed with due regard for fine detail, it will not be productive of results.

The following are the various methods which have served a definite purpose in the anatomical location and differentiation of these calculi.

1. The shadow of a renal calculus is much smaller and more clearly defined with the plate posterior and the tube anterior (Fig. 19). The shadow of a biliary calculus is much smaller and more

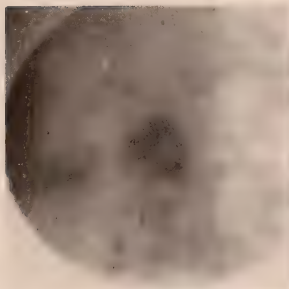


Fig. 13.—Biliary calculi.

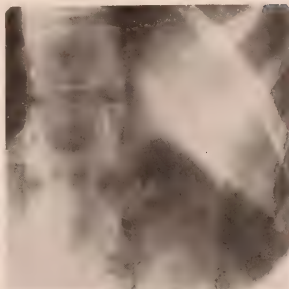


Fig. 14.—Biliary calculi.



Fig. 15.—Biliary calculi.

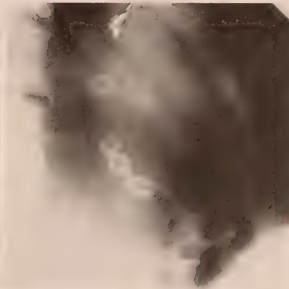


Fig. 16.—Biliary calculi. Same case as Fig. 15.

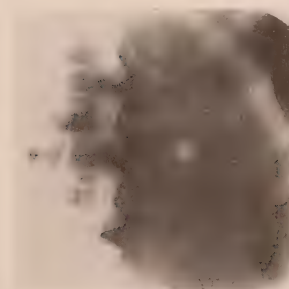


Fig. 17.—Biliary calculi.

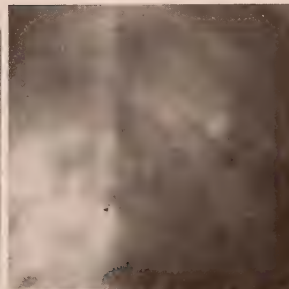


Fig. 18.—Renal calculus.

defined with the plate anterior and the tube posterior. If these conditions are reversed, the stone appears much larger and less clearly defined (Fig. 20).

2. If the plates are made and viewed stereoscopically, renal calculi appear in a posterior plane near the vertebral column, while biliary calculi appear in an anterior plane just above or beneath the costal arch (Fig. 11, 21).

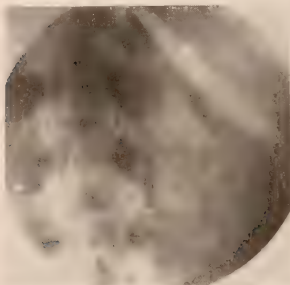


Fig. 19.—Biliary calculus.



Fig. 20.—Biliary calculus. Same case as Fig. 19.

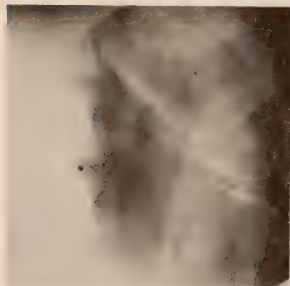


Fig. 21.—Biliary calculi. Compare relation of calculi to ribs in Fig. 11.



Fig. 22.—Same case as Figs. 19 and 20. Lateral view. Calculus in plane anterior to spine.

3. If two plates are made with a lateral shift of the tube between the two, even though they are not viewed stereoscopically, many times there will appear an altered relation between the stone and the kidney or gall-bladder outline which will readily make the differentiation possible (Fig. 11, 21.)

4. If direct lateral plates are made with the patient lying with the right side on the plate, gall-stones will be shown in an anterior

plane (Fig. 22), and renal calculi will lie in a posterior plane, possibly obscured by the lateral view of the spine.

5. If any of the standard methods for the localization of foreign bodies are employed, the proximity of the stone to the anterior or posterior wall can be shown. A very simple method of foreign body localization which I published in 1902 is ideally adapted for this work.¹ It has the advantage of not requiring additional accessories or complicated apparatus.

6. Pyelography or ureteral catheterization serves as an accurate method for the anatomical localization of renal or ureteral stones. Gastrography, or plates made with the stomach and duodenum filled with an opaque suspension, serve as an accurate method for the anatomical localization of gall-stones as well as showing much indirect evidence of the stone by demonstrating the presence of adhesions, distortion of the cap, and spasm.

¹Cole, L. G. (Medical News, March 15, 1902).

REPORT OF TWO UNUSUAL CASES OF FRACTURES.

By ARRIE BAMBERGER, B. S., M. D.,

Instructor in Surgery, Medical Department, University of Illinois, Chicago.

The reason for my reporting these two cases of fracture is the unusual features connected with them, the first case having an unusual pathology, and the second case an unusual etiology.

CASE I.

R. D., a machinist, 40 years of age, was admitted to my clinic May 16, 1916, giving the following history: While at work 6 days previously, he suddenly



Fig. 1.

fell to the floor, the cause for which was unknown. He was removed to the company's hospital and remained there two days, and then went home, being displeased with the treatment he was receiving. Few days later he came to the University for examination.

Examination.—At that time examination showed swelling and ecchymosis about the right clavicle, and total inability to move the arm at the shoulder joint. On palpation I found that the outer half of the clavicle could be depressed, and that when pressure was released, it would rebound upward, and the acromial end of the clavicle would be above the acromion process.

With these findings I made the tentative diagnosis of acromio-clavicular disarticulation, and ordered an x-ray to be taken. The x-ray picture, as in

Fig. 1, showed a longitudinal fracture through the clavicle, with an upward displacement of the superior fragment.

Treatment.—I put the arm up in Sayre's dressing together with a pressure pad over the superior fragment. It was so immobilized until July 11, 1916, at which time the x-ray picture, as in Fig. 2, showed a good callus formation. There was no tenderness over the clavicle, and the acromial end felt firmly united to the acromion. Twelve weeks after injury he showed good use of the arm.

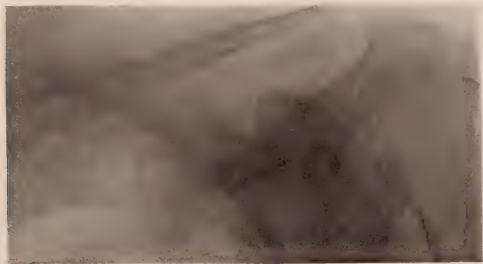


FIG. 2.



FIG. 3.

CASE II.

Bessie S., a married woman, 40 years old, was admitted May 9, 1916, giving the following history: The day before, while beating a carpet with a wire carpet beater, the beater suddenly became caught in one of the folds of the carpet, and by so doing twisted her wrist. She had intense pain in the wrist but finished beating the carpet. For the first 24 hours she applied home remedies, which gave no relief. Her past history was negative as regards any chronic debilitating condition.

Examination.—Swelling and ecchymosis about the dorsum of the right wrist, impaired motion, and local point of tenderness over the lower end of the radius. There was no deformity except that produced by the swelling. The x-ray picture, as in Fig. 3, showed a complete fracture through the lower end of the radius. For so slight a trauma as this to produce a fracture in an adult in good health, I believe is rather unusual.

THE PILONIDAL SINUS.

By JOHN W. LANE, M. D., F. A. C. S., Boston.

The mind of the profession is today entirely taken up with the investigation of the so-called major subjects, but there is much in the little things.

The pilonidal sinus is a minor condition which afflicts a surprisingly large number of individuals, and which is often carelessly treated in the large clinics. It consists of a sinus located over the sacrum, in or about the midline of the back. This sinus discharges intermittently a thin, purulent and offensive liquid. The sinus is more annoying than painful, and is due to a failure of the lower end of the medullary canal to completely close during the develop-

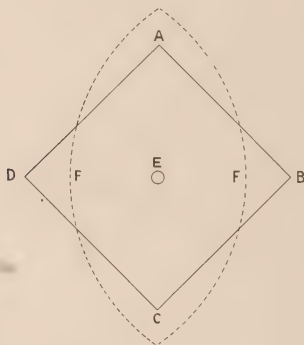


Fig. 1.

A, B, C, D, points of injection of local anesthesia. E, sinus opening. F, F, incision.

ment of the fetus. As a result of this failure of closure, there occurs an invagination of the cells of the ectoderm, which later differentiate and produce the more highly organized hair follicle. With an inclusion of a group of cells of the hair-producing type at the time of puberty or after, there is a growth of hair produced. This later, as the result of trauma and bacterial infection, sets up and inflammatory reaction, resulting in the formation of pus, necrosis of the overlying skin, and the formation of a discharging sinus.

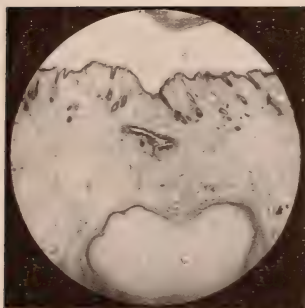


Fig. 2.

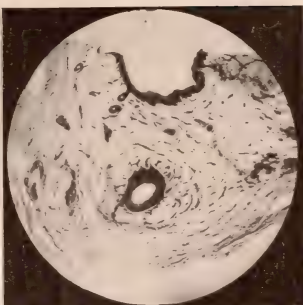


Fig. 3.

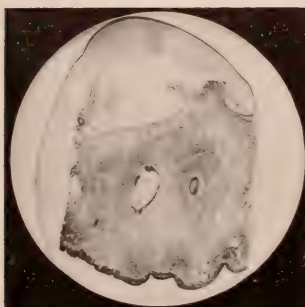


Fig. 4.



Fig. 5.

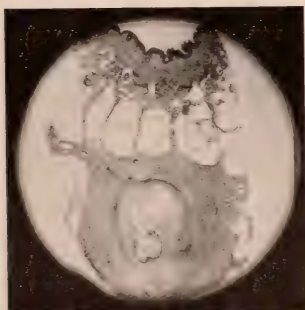


Fig. 6.

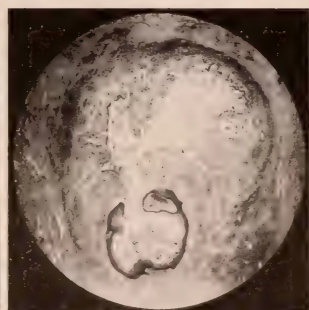


Fig. 7.

A careful inspection of the sacral region of many small children has shown the following results (these children were taken in consecutive order) :

Thirty-nine children from 2 to 4 years old showed 2 sinuses and 11 sacral dimples. Twenty-five children from 1 to 2 years old showed 2 sinuses and 7 dimples. Twenty-one children from 6 months to 1 year old showed no sinuses and 11 dimples. Eighty-five children examined showed 4 sinuses and 29 dimples. This corresponds to the percentage reported by Peck.

These dimples are depressions which occur at the lower end of the sacrum at the position where the medullary canal would be if it failed to close in the development of the embryo. The fundamental etiology of the pilonidal sinus is, therefore, evidently congenital. These areas lie quiescent without any clinical evidence of their existence unless stimulated to inflammatory reaction by trauma.

The sinuses, as a rule, do not develop until early adolescence, at which time the great activities of life tend to multiplication of chances for injury. The usual history is as follows: The patient states that he had a fall or sat in a chair suddenly, or bumped against something; following this he felt very sore over the sacrum, and then, a few days later, noticed that his underwear was stained by a bloody discharge. This discharge continues for a time, and then, the acute disturbance having quieted, the slowly discharging material coagulates, crust formation results, and the discharge ceases, only to recur in a few days or weeks and rarely months. This process is continually repeating itself, with a greater or less amount of subjective irritation, until the patient seeks operation for his relief. The only treatment of this condition which guarantees a cure is operation, with complete excision of the entire tract of the sinus. The operation can be done under local anesthesia without any difficulty.

My mode of procedure, which as yet is invariably successful, is as follows: Four points, each about one and one-half equidistant from the sinus opening, are selected. A long needle is introduced toward the sinus and the area is blocked with a solution of one-half percent cocaine and adrenalin, 10 drops to the ounce.

A probe is introduced into the opening and passed in all possible directions in order to definitely locate all the ramifications of the sinus. A wide, elliptical incision is then made, extending sufficiently laterally to include all the diverse tracts, and the whole pathological area is excised *en bloc*. The resulting wound, no matter how extensive, is packed with iodoform gauze and permitted to heal from the bottom. Some authors have reported that the wound can be closed primarily. In my early cases, following this line of teaching, I may two very dismal failures.

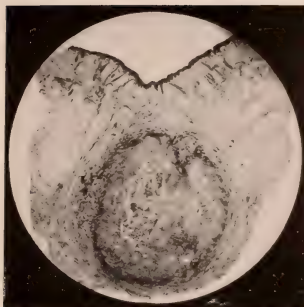


Fig. 8.

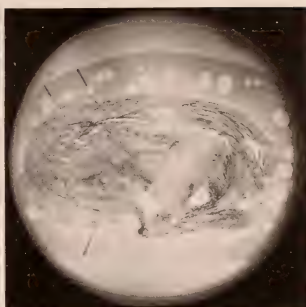


Fig. 9.

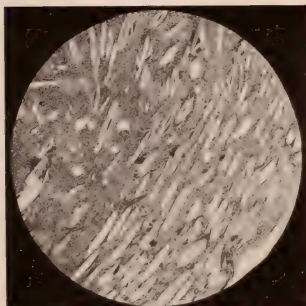


Fig. 10.

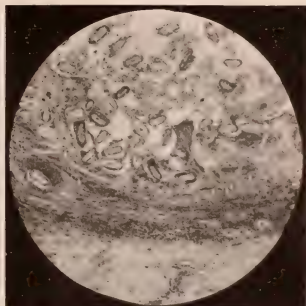


Fig. 11.

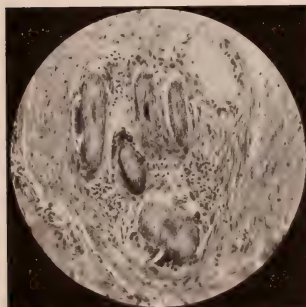


Fig. 12.

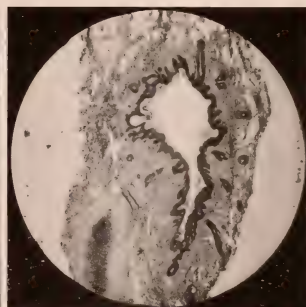


Fig. 13.

The pathology of this condition is well illustrated by the microphotographic reproductions which were kindly furnished me by Dr. F. B. Mallory, pathologist to the Boston City Hospital. The cases in these series have been 21, in all of which hair was noted.

Giffen and Archibald, in reporting a total of 31 cases in the Mayo clinic, state that the presence of hair was noted in but 6 cases; that in 20 traced cases there were 5 failures to heal. The exact technic, however, is not given. Godin believes that there is a certain amount of heredity in these cases, and he reports 4 cases occurring in a grandfather, his son, and his two grandchildren.

Some of these sinuses are very extensive, especially when they have been long neglected, and Goodsall reports a case of a sinus which "was found to enter the pelvis through the sacrosciatic notch, to come down again beside the anus."

It, therefore, can be readily seen that what appears to be a perfectly simple surgical condition may be found at operation to be a grave and serious affair. Radical excision of the entire tract without any attempt at primary closure is followed in all cases, where the dressings have been done with due care, by a complete and final cure.

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A STUDY OF OIL OF CHENOPodium.

By W. H. ZEIGLER,

Professor of Pharmacology, Medical College of the State of South Carolina.

Introduction.—The administration of oil of chenopodium in the treatment of hookworm disease is undoubtedly growing in interest. This is partly due to the European war, which has limited the supply of thymol, but more especially to the reports of physicians who have found it to be a most effective remedy. While this drug and the plant from which it is obtained have been used as a vermicide for years, it is only recently that they have been recommended as a specific in uncinariasis. The results have been more or less satisfactory, but the development of toxic symptoms in several instances has led to the question as to whether it is a safe substitute for thymol.

It is well known that drugs used as vermicides are toxic to all forms of protoplasm, the ideal remedy being one that while paralyzing the parasite is absorbed in amounts not toxic to the host. Clinical experiments have proven that oil of chenopodium will produce the desired effect when thymol fails. If the drug is then more toxic to the parasite, it follows that, if it is absorbed, it will prove more toxic to the host.

Levy¹ reports 12 cases of poisoning collected by him; 9 of the 12 proved fatal; 8 of the 12 occurred in children under 13 years of age. Three deaths occurred in one family from the administration of 4, 6, and 8 drops three times daily for two days, on the third day this amount being repeated. The ages were 1, 3 and 6. It was noted that no purge was given. In the majority of the cases large doses were given. He also reports several cases in adults in which no unpleasant effects occurred, the drug proving effective when the usual thymol treatment had failed. His conclusions were that it was non-toxic when administered in therapeutic doses.

In a history of two cases of uncinariasis, treated with this drug and reported by Elmendorf and Walker,² a total of 100 and 165 minims respectively in doses of from 10 to 20 minims was given to two boys of five and six years of age. There were no unpleasant symptoms. A total of 415 hookworms were collected in one case and 678 in the other.

It has been suggested by Howard in his article on the standardization of the treatment of hookworm infection, that not all lots of the oil of chenopodium supplied by the dealers are of equal potency,

and that this might explain the lack of uniform results. It has also been suggested that inaccuracy in dropping the oil may account for the toxic symptoms.

The following study was undertaken in the hope that these questions might be answered. This, I believe, has been accomplished. The experiments were of sufficient number, and made on dogs of age and breed to clear away any confusion that may exist.

History.—Oil of chenopodium is a volatile oil distilled from the fruit of the *Chenopodium ambrosioides anthelminticum*, a common weed found growing in the vicinity or rubbish, along fences and in the streets. It is known as American wormseed, Jesuit or Mexican tea, and among the negroes of the South where it grows in abundance, as Jerusalem or Jerusalem oak. It has been for years a common remedy among them for worms, used in the form of the expressed juice or an infusion. It is the anthelmintic principle in most of the worm syrups on the market today. The Chenopodiaceae family, of which this plant is a member, is quite a large one. It is commonly known as the spinach or goosefoot family. The latter name is given because the leaves have the shape of a goose foot. Spinach and the beet are also members. It may be of interest to state just at this time that what is known as lamb's quarter or pig's weed and recommended as a salad is also a species of chenopodium. This plant is the *chenopodium alba* and, besides containing a large percentage of iron, is also said to possess sedative properties.

We find in the American Dispensatory² of 1814 the following description of the *chenopodium anthelminticum*: "The plant grows plentifully in the United States and is much used for worms, tastes bitter. The whole plant may be employed. The expressed juice is used in doses of ʒss for a child 2 years of age. A decoction of the plant is made by boiling the green leaves. Great numbers of worms are frequently discharged." Wood¹ in his Treatise on Therapeutics and Pharmacology, 1860, mentions two varieties, the *chenopodium anthelminticum* which is highly odorous, and the *chenopodium ambrosioides* which he says is sometimes substituted for the genuine. This species is indigenous to the middle states, the odor is weaker and rather agreeable than offensive. It is used in Europe as a remedy in nervous affections. The dose of the oil of chenopodium from the genuine drug is given by him as from 4 to 8 drops for a child from 2 to 4 years of age. He calls attention to the fact that in overdoses it is capable of producing dangerous if not fatal effects. The oil of chenopodium found on the market today is of a light yellow color, characteristic odor, and bitter taste. The active principle is ascaridol. The pharmacopeal dose is 3 minims. The plant is now being cultivated in Maryland for the oil and is known commercially as Baltimore oil of chenopodium.

Gastro-Intestinal Absorption.—The following experiments were planned with several ideas in view. To determine (1) the toxic dose, (2) if the toxicity was influenced by the age, (3) if the oils of chenopodium found on the market today varied in potency, (4) the absorption from the stomach, (5) the absorption from the intestines.

Dogs were the animals used exclusively throughout the experiments. They were divided into several groups consisting of young and old animals. These were further divided into groups, each group receiving different lots of the oil. The animal was first weighed and the drug administered by stomach tube in the form of an emulsion made up with acacia, and in gelatin capsules. Sixty animals were used in these experiments. The toxic dose when administered in this manner was found to be .5 mil per kilo. This usually proved fatal within 48 hours. When the drug was given in gelatin capsules in twice this dose or 1 mil, death occurred in less time. Salant⁵ and Nelson, in a series of experiments with the toxicity of this drug, found that the minimum fatal dose for cats was .2 mil per kilo. He also found that while .6 mil per kilo proved fatal to cats in eighteen hours, it failed to produce any symptoms in rabbits or guinea pigs. They found that the resistance of dogs, rabbits and guinea pigs to chenopodium was approximately the same.

As seen by the protocol that follows, the absorption from the stomach was rapid. In the majority of the experiments the first symptom appeared in less than ten minutes. This consisted of a weakness in the hind legs followed by vomiting, salivation, coma, convulsions, and death. In smaller doses, .125 and .250 mil per kilo, the symptoms were modified and the recovery was fairly rapid, but the second and third dose, when given at about thirty hours' intervals, finally proved fatal. This substantiates the findings of Salant, who made tests to determine if tolerance could be established in rabbits. He found that non-toxic doses proved fatal when repeated in a day or two, thus pointing to a cumulative action. When the oil of chenopodium was given in still smaller doses it did not produce any symptoms. When the drug was given by weight, age did not influence the toxicity. The absorption from the stomach was probably more rapid in the very young animals.

No variance in the potency of the four lots of oils used could be noticed in any of the experiments. There was no movement of the bowels in any of the experiments in which the fatal dose was administered. When larger amounts were given in several instances this did occur. Salant and Livingston,⁶ experimenting with this oil upon segments of animal intestines, found that, in weak solutions, it decreased the tone and diminished the frequency as well as the force of the contractions. The excreta of the animals

was examined and parasitic ova found present. An adult *ascaris canis* in an inactive state was found in one specimen, and, upon being placed in a fresh mixture of feces and water in an incubator, revived after several hours and became active. When the stools were kept for awhile the embryo of ankylostoma was found. It was noted also that there was a retention of urine. The bladder was found empty in the majority of the animals examined.

The following protocol will illustrate the method used in obtaining records in the experiments:

PROTOCOL.

Experiment 4. Dog, male, 5.3 kg. Age, about two years.

May 8, 1917. 1:10 p. m.—.5 mil. oil of chenopodium in emulsion by stomach.

1:20 p. m.—Weak in hind legs, staggers about in cage.

1:30 p. m.—Vomits.

1:35 p. m.—Great restlessness, staggers, salivation.

2:00 p. m.—Profuse salivation, on side.

3:00 p. m.—Coma.

5:00 p. m.—Deep coma.

May 9, 1917. 8:30 p. m.—Convulsions.

Died during night.

Post-Mortem Findings.—All animals examined post-mortem showed an acute toxic gastritis. The stomach of one showed marked changes. The most characteristic condition noted under microscopic examination was an acute diffuse nephritis. The liver showed necrosis with cloudy swelling and hemorrhagic infiltration.

Enteric Capsules.—In order to determine if the absorption from the intestines was as rapid as it was from the stomach, a series of experiments were made in which 1 mil of oil of chenopodium per kilo was administered in capsules that had been carefully coated with salol. Two animals were used for each experiment, one was used as a control and received the same amount per kilo in plain gelatine capsules. The capsules were given by using a wooden gag with a large opening, the capsule being placed on the back of the tongue with a pair of long forceps. The mouth being quickly closed and the animal was made to swallow the capsule by slapping on the throat. At first some difficulty was experienced in placing the capsule far enough back in the mouth of the animal to cause its rapid passage into the stomach. In several instances the animal managed to get the capsule on the tongue and in this way the coating was broken. The method, as outlined, proved effective and very few of the capsules had the coating destroyed. In order to coat the capsules successfully the following method was used. It was found that if the smallest amount of the oil reached the outside of the capsule it was almost impossible to make the salol adhere. This is due to the fact that salol is soluble in the oil. The capsules were filled with a hypodermic syringe and sealed by

moistening the edges with a small amount of water. The salol having been melted with a moderate heat, the capsules were dipped and allowed to dry. This was repeated until a thick coating resulted.

Ten animals were used in this experiment with the following results: Absorption was delayed from thirty minutes to one hour and a half, and resulted in several instances only in vomiting and salivation. Only two of the animals died. Some difficulty was experienced in making these swallow the capsules and it is possible that the coating was broken. The majority of the animals survived, although they had received twice the toxic dose. In all of these experiments the animals were placed in metabolism cages and watched carefully to see that none of the capsules were vomited or passed in the stools. Two animals were given 1 mil per kg. of the drug in salol capsules and chloroformed at the end of two hours, and the stomach and whole intestinal tract examined for undissolved capsules. None was found, but evidence of their solution noticed in the intestinal tract.

The following protocol will serve to illustrate the method used in keeping records:

PROTOCOLS.

Experiment 1.—May 24, 1917. 1 mil. oil chenopodium in salol coated capsules. Dog, 10 kg.

12:35 p. m.—10 capsules by mouth.

2:05 p. m.—Vomits, weak in hind legs. No other symptoms.

5:00 p. m.—No symptoms.

May 28, 1917. Alive. Fully recovered.

Experiment 2.—May 24, 1917. 1 mil. oil chenopodium in gelatin capsules. Dog, 8 kg.

11:15 a. m.—8 capsules by mouth.

11:30 a. m.—Vomits, salivation.

12:30 p. m.—Deep coma.

1:00 p. m.—Convulsions.

4:00 p. m.—Dead.

Laparotomy Experiments.—The rapid absorption of the drug from the stomach and the inhibition of its toxicity when administered in salol-coated capsules led to a series of experiments with the hope of solving this problem. These consisted of (1) Injecting the oil into the intestines. (2) Injecting the oil in which .2 gm. of salol had been dissolved into the intestines. (3) The placing of salol coated capsules in the intestines. The operation, performed under ether without the usual preliminary injection of morphine, was completed in a few minutes. The animal was protected from shock by artificial means. The intestines were carefully injected with the oil and replaced. The incision was sewed up and the animal placed in a metabolism cage. The salol-coated capsules were inserted into the intestines by making an incision which was afterwards tied off.

As seen by the protocols that follow, the absorption from the intestines is slower than from the stomach. It was noted that the absorption was delayed even more when the oil in which salol was dissolved was injected. When the capsules coated with salol were inserted no symptoms were observed after 2 hours. The animals died during the night. There was no evidence of any struggle, and when posted the capsules were found dissolved and free oil in the intestines.

PROTOCOLS.

June 13, 1917. 1 mil. oil of chenopodium injected into intestine.

Dog, 4.7 kg.

11:00 a. m.—Operation complete.

4:07 p. m.—1 mil. oil of chenopodium.

11:45 a. m.—Tries to vomit.

2:00 p. m.—Comatose.

5:00 p. m.—Coma.

Died during night.

June 12, 1917. 1 mil. oil of chenopodium and 2 gm. salol in intestine.

Dog, 4.4 kg.

11:35 a. m.—Operation complete. 44 mil. of combination.

1:35 p. m.—No symptoms.

4:00 p. m.—Vomits.

5:00 p. m.—Comatose.

June 13, 1917. Died during night.

June 25, 1917. 1 mil. oil of chenopodium in salol capsules, inserted into intestines.

Dog, 5.7 kg.

11:45 a. m.—Operation complete, 6 capsules inserted.

2:00 p. m.—No effect.

6:00 p. m.—No effect.

9:00 p. m.—No symptoms.

Died during night.

Blood Pressure and Respiration.—Salant and Livingston⁷ in a series of experiments upon blood pressure and respiration in the animal found that in doses of .02 mil to .085 mil per kg. oil of chenopodium caused a fall of blood pressure and that the effect was greater in the dog than in the rabbit or cat. Also that when the injection was repeated until the total amount reached 2 mils per kg. no response of the circulation could be observed. They also found that the drug when injected intravenously produced a profound depression of the respiration, and that, unlike the circulation, respiration was still further slowed by repeated doses and finally ceased altogether. The following experiments were conducted with a view of determining if the oils differed in effect upon blood pressure and respiration, and if atropine would antagonize this effect.

Methods Used.—(1) The drug in 1 percent emulsion made up with acacia was injected into the femoral vein in measured amounts, while the carotid artery was connected with a mercury manometer for recording the blood pressure. The respiration was recorded

at the same time on a revolving drum carrying smoked paper. The motion of the respiration was transmitted to a lever connected to the thorax. (2) Atropine was injected intravenously, until there was no response from the vagus when stimulated electrically. This was followed by the injection of the oil of chenopodium. (3) The drug was introduced into the stomach with a stomach tube while the blood pressure and respiration were being recorded. (4) The oil was injected with a hypodermic syringe into the intestine while the blood pressure and respiration were being recorded. Morphine and chloretone anesthesia was used throughout the experiments.

Results.—Dogs were used exclusively. Two different lots of oil were used in doses of .01 mil per kg. This amount caused a fall of blood pressure of several mm. of mercury, which slowly recovered. It was noted in several instances that there was no effect

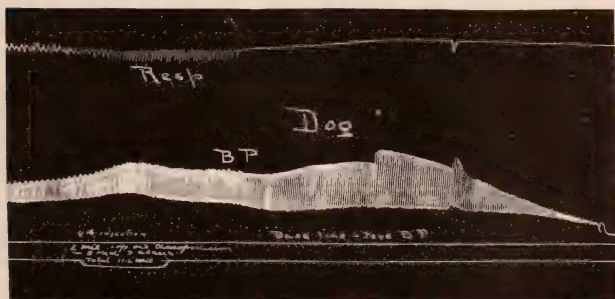


Chart 1.—Showing the final effect on blood pressure and respiration when oil of chenopodium was injected intravenously. Note that the respiration ceased first.

from the second injection of this amount. After the third injection there was a rise in one instance of 20 mm. mercury. The respiration was not affected. The fourth injection, while producing no effect upon the blood pressure, caused a marked slowing of the respiration. After a total of .34 mil had been injected the respiration ceased while the heart continued to beat. (See Chart 1.)

Atropine Followed by Chenopodium.—It was noted in the experiments dealing with the toxicity of chenopodium that if atropine was injected subcutaneously until the pupil was dilated, and the toxic dose of chenopodium administered, while death always occurred, there was an absence of the salivation, emesis, and marked depression of the respiration. This apparent antagonism led to the following experiments which consisted in injecting intravenously atropine followed by chenopodium. As seen by the protocol,

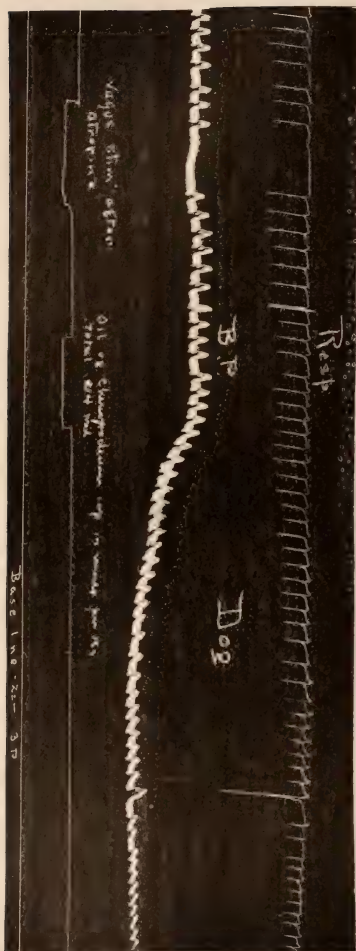


Chart 2.—Showing the effect of oil of chenopodium on blood pressure and respiration after atropine. Note that the respiration is not affected.

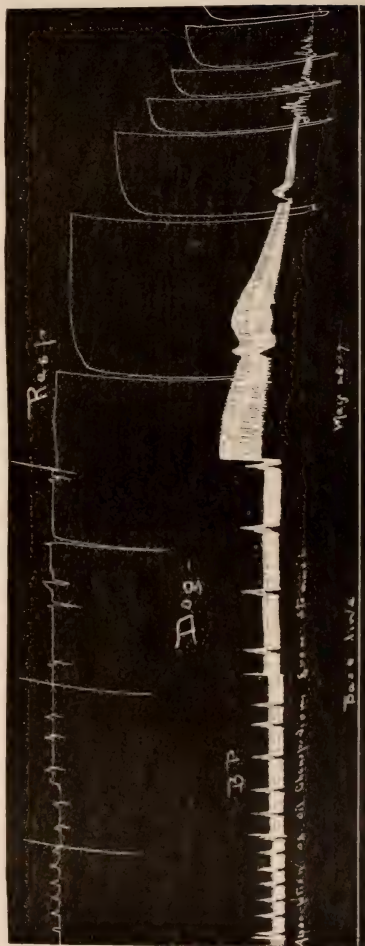


Chart 3.—Showing the final effect on blood pressure and respiration of .5 mil. per kg. of oil of chenopodium absorbed from stomach.

the blood pressure continued to fall with each injection. That recovery was more rapid from the second injection is seen by comparing Charts 2 and 3. The respiration was not affected, and it was only after several hours and until a total of 2 mil per kg. was injected that the heart ceased to beat.

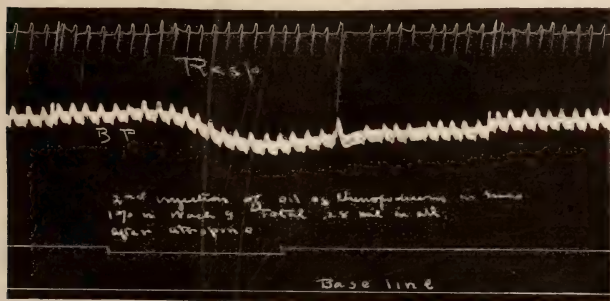


Chart 3.—Showing the effect of a second injection of oil of chenopodium after atropine. Note that the respiration is slightly more rapid than the recovery of the blood pressure.

PROTOCOL.

May 30, 1917. Dog, 14 kg. Morphine, chloretone.

12:10 p. m.—Atropine, 1/10 per cent. intravenously until vagus is paralyzed.

1:50 p. m.—B. p., 80; respiration, 9.

2:30 p. m.—B. p., 80; respiration 10. Oil of chenopodium, .01 mil. per kg. intravenously. B. p., 50; respiration, 13.

2:50 p. m.—B. p., 66; respiration, 14.

2:55 p. m.—B. p., 74; respiration, 13.

3:00 p. m.—Oil of chenopodium, .01 mil. per kg. intravenously.

3:05 p. m.—B. p., 66; respiration, 12.

3:06 p. m.—Oil of chenopodium, .03 mil. per kg.

3:20 p. m.—B. p., 56; respiration, 12.

3:30 p. m.—B. p., 80; respiration, 14.

3:40 p. m.—Oil of chenopodium, .05 mil. per kg. B. p., 50; respiration, 15.

3:55 p. m.—Oil of chenopodium, .05 mil. per kg.

4:00 p. m.—B. p., 50; respiration.

4:10 p. m.—Oil of chenopodium, total amount injected, 1 mil.

5:00 p. m.—Total amount oil of chenopodium injected, 4 mil.
Death.

Absorption From the Stomach and Intestines.—In these experiments the animals were connected for blood pressure and respiration as in the preceding series. The drug was introduced into the stomach in the form of an emulsion through a stomach tube. After .5 mil per kg. had been injected there was in 20 minutes' time a fall of 4 mm. mercury. The respiration had decreased two per minute. This effect continued until the respiration and heart ceased. (See Chart 4). The drug in 1.0 mil doses per kg. was also

injected into a loop of intestine about 15 cm. long while the blood pressure and respiration were being recorded. It was only after several hours that the blood pressure and respiration were affected.

DISCUSSION.

The experiments described in the foregoing sections, commencing with the study of the gastrointestinal absorption, present many interesting phases. The symptoms produced by toxic doses are identical with those reported in human subjects. There was always the emesis, salivation, staggering, coma, convulsions, and death. It was noted that, while half the toxic dose did not prove fatal, the second dose did. This and the fact that the drug lessens peristalsis, would show conclusively the advisability of always following the oil of chenopodium with a purge. Unlike thymol this can consist of either Epsom salts or castor oil. When larger amounts were administered per kilo based upon the therapeutic dose for an individual of 75 kg., there were no symptoms of poisoning.

That not all lots of the oil of chenopodium supplied to the trade by the distillers are of equal potency was not verified by the experiments. No marked difference in effect could be noticed although four lots of oil were used. Some of these were of recent distillation, others had been standing for some time.

The two sets of experiments used to ascertain if there was any variance in the toxicity of the drug in animals of different ages, while showing possibly a more rapid absorption in very young animals failed to show that the toxicity was influenced by the age. It was noted in several of the experiments that, if the animal were in an apparently healthy condition, the effect of toxic doses was not as marked as when they were impoverished and mangy. This is of some interest and may show why oil of chenopodium should be administered with caution in hookworm disease, where the pulse is weak and irregular, and there are mental and nervous symptoms and dyspnea present.

The absorption of the drug from the stomach is very rapid. That the emetic effect is probably due to a direct action on the vomiting centers shown by the fact that the first symptom noticed in many of the animals was a staggering due to the absorption of the drug into the circulation and that when the drug is introduced into the intestine it also produces emesis. Atropin antagonized both the emetic and salivating effect.

The results obtained when oil of chenopodium was injected into the intestinal tract show conclusively that it is absorbed with less rapidity than when administered by the stomach. When a laparotomy was performed and the drug injected in 1 mil per kg. doses in 15 cm. loops a large percentage of oil could be recovered. No attempt was made to ascertain just what percentage was absorbed.

The first symptoms usually occurred in from a half to one hour's time. The results obtained when salol coated capsules were administered were of considerable interest. When these were successfully given in one or two instances there were no signs of absorption, and in the majority of cases only slight symptoms, the animal being fully recovered by the next day. The absorption here was further delayed due to the passage of the capsule into the intestine where it dissolved in the alkaline media. When animals were chloroformed just as the first symptom occurred and the intestinal tract examined, evidence of their solution and free and saponified oil was found. This apparent lack of absorption led to the experiments in which the oil containing .2 gm. of salol was injected into the intestine. It was noted that the absorption was slower than when the oil was injected alone, but its toxicity was not destroyed. The experiments were not enough in number to make this conclusive, however. I hope to continue this investigation at a later time. When the capsules containing 1 mil of the oil which had been carefully coated with salol were placed in the intestine, this absorption was further delayed so that no effect could be observed after twelve hours. The absence of symptoms or non-toxic effect when administered in salol-coated capsules may be explained, by a checking of absorption by the phenol liberated from the phenyl salicylate in the intestines. Hanzlik⁸ in his classical experiments with the gastrointestinal absorption of drugs found that phenol would check the absorption of alcohol as well as the iodide of soda, and that, while the absorption of sodium iodide from the intestines is at first rapid so that 50 percent to 75 percent was absorbed within ten minutes, it was checked so that after two hours 25 percent to 50 percent remained unabsorbed. The experiments show that the absorption is more rapid from the stomach than from the intestines. Just what effect this delayed absorption of the oil when administered in enteric capsules would have upon its vermicide effect I am unable to say at this time, but certainly I believe that the most rational method of administering the drug in hookworm disease would be in this manner.

The effect upon the blood pressure and respiration when oil of chenopodium is injected intravenously is one of depression. The effect is most marked upon the respiration. As seen by Chart 1, the respiration ceased while the heart was still beating. Atropine antagonized the effect upon the respiration so that it was only after very large doses that death would result. (See Chart 2.) Salant and Livingston,⁹ in a series of experiments upon isolated frogs' hearts, came to the conclusion that the drug probably affected the muscular substance of the heart.

It was noted that, when atropine was previously injected intravenously until the vagi no longer responded to electric stimula-

tion, .01 mil of oil of chenopodium administered in a like manner continued to produce a fall in blood pressure with each injection. This differed inasmuch as when the oil was injected alone the pressure did not fall with the second injection. This shows that the fall in pressure is not due to a slowing of the heart from vagus stimulation. It is probably due to depression of the vasomotor center and heart muscle.



Fig. 5.—*Chenopodium ambrosioides anthelminticum*, from which the oil of chenopodium is obtained.

The convulsions which occurred several hours after the administration of toxic doses of oil of chenopodium are of interest. They were always preceded by coma and resembled struggling rather than a convulsion due to a direct convulsive effect. This struggling was often accompanied by barking. The noise was so great that in several instances chloroform or morphine had to be administered. Several causes are suggested: (1) That it may be due to the approaching asphyxia, caused by the depression of the respiratory center. (2) Due to an anemia of the nervous centers, caused by the lowering of blood pressure. (3) That it may be due to a neuritic toxemia. I am inclined to believe from the postmortem findings that the last theory is correct.

In view of the fact that in the various outlines of treatment of hookworm disease the dose of oil of *chenopodium* is given in both drops and minims, it may be well to call the attention of the profession to the fact that these differ. When a medicine dropper was used it was found that it took 150 drops to make one fluid drachm or 60 minims. Each minim being equal to $2\frac{1}{2}$ drops. The pharmacopeal dose is 3 minims or about 8 drops. The dose recommended in uncinariasis is 16 drops or minims repeated in several doses. It is clearly seen that if minims are used, the dose would be excessive, the patient receiving about 40 drops at a dose. If this is repeated for three or four doses at hour intervals it would undoubtedly produce toxic symptoms. The minim graduate is far from being accurate as there is always a certain amount retained. The medicine droppers are inaccurate, and by no means should the drug be dropped from the bottle. The most accurate method would be to use a graduated pipette.

CONCLUSIONS.

1. The oil of *chenopodium* found on the market does not vary in potency.
2. The toxicity is not influenced by the age of the animal.
3. The absorption is more rapid from the stomach than from the intestines.
4. Atropine antagonizes the depressant effect upon the respiration.
5. Small doses are nontoxic.
6. When oil of *chenopodium* is administered to dogs in salol-coated capsules, the absorption is delayed.
7. The cause of death in the dog when oil of *chenopodium* is administered in toxic doses is an acute diffuse nephritis.
8. The failure to differentiate between drops and minims, and the failure to follow therapeutic doses with a purge, are probably the principal causes of the fatal effects seen in several cases of uncinariasis treated with this drug.

I wish to acknowledge the valuable assistance given me in this work by Dr. F. B. Johnson, of the department of chemical pathology, who made the examinations of all excreta, and by Dr. A. B. Pavy, of the same department, for the post mortem examinations.

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THE SIGNIFICANCE OF TUBERCLE BACILLI IN THE URINE.*

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When tuberculosis involves some portion of the body other than the genitourinary tract, the presence of tubercle bacilli in the urine either means nothing or is of great importance, depending on whether we consider the normal epithelium of the genitourinary tract capable of excreting the tubercle bacillus or not.

It is evident that if the normal mucous membrane can excrete the tubercle bacillus, the finding of this organism in the urine does not necessarily indicate the existence of a tuberculous lesion in either the genital or the urinary tract. On the other hand, if tubercle bacilli can not be excreted by the normal mucous membrane, then the presence of these germs in the urine means definitely that a tuberculous focus exists in one or the other, or perhaps both, of these tracts.

It is the positive belief of the authors, derived both from a careful search of the literature and from their own work on this subject, that when tubercle bacilli are found in the urine it indicates the presence of a tuberculous lesion somewhere in the genitourinary tract, and it is their aim to impress this belief on the medical profession, along with some other conclusions reached in the course of the work described in this paper.

Work done previously to 1905, as represented by the publications of Foulerton and Hillier,¹ Bonney,² Walsh,³ and Rist and Kindberg,⁴ led to the belief that the normal mucous membrane was capable of excreting tubercle bacilli. In the light of subsequent researches it develops that this conclusion was based on erroneous data, obtained by faulty experimentation and unjustified deductions. For instance, Walsh³ found that 82.5 percent of the guinea pigs inoculated with urine of patients suffering from pulmonary tuberculosis contracted tuberculosis. This result has not been obtained by any other investigator. Contrarily, most workers have found the percentage to be less than 20. The work of Foulerton and Hillier,¹ which, at first glance, seems to prove conclusively that normal mucous membrane can excrete tubercle bacilli, is of interest in this connection. They showed by autopsy that tuberculous patients in whose urine tubercle bacilli had been demonstrated by

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means of the guinea pig had no lesion of the kidneys. They failed to examine the genital tract. Accordingly, their observations are of value only in pointing out the necessity of taking the genital tract into consideration when tubercle bacilli are found in the urine. Nowhere in the literature can we find a series of cases in which the presence of tubercle bacilli has been demonstrated in the urine by means of the guinea pig before death where autopsies have proved the absence of tuberculous lesions in both the genital and urinary tracts. Therefore, there is no proof that normal mucous membrane can throw out tubercle bacilli.

Since 1905, all the work on this subject tends to prove that, when tubercle bacilli are found in the urine, a tuberculous lesion exists somewhere in the genitourinary tract. Bernstein⁵ found tubercle bacilli in the urine of 10 of 100 tuberculous patients examined. He was able to investigate only three of these patients, but in all of them tuberculous lesions of the genitourinary tract were demonstrated. Similar results are reported by Cunningham.⁶ Fowler and Philpott⁷ found the percentage to be 16, which is the highest obtained by any observer during this period. We found tubercle bacilli in 4 of the 100 cases examined.

Regarding the possible errors in detecting tubercle bacilli in the urine, it is well to realize that the microscope is a source of grave error, and that contamination during the collection and handling of specimens plays an important rôle. Young and Churchman⁸ have conclusively shown that the smegma bacillus exists in the anterior urethra of a large number of people, and that it is impossible to differentiate, by any staining method, the smegma bacillus from the tubercle bacillus. Also, it is possible to mistake artefacts for tubercle bacilli when using the microscope. Unless the urine be collected in a sterile container, after the meatus urinaris externus has been rendered as sterile as possible, and great care used in handling the specimen, contamination is very probable.

TECHNIC.

A morning specimen of urine from each of 100 male patients known to be suffering from pulmonary tuberculosis was passed into a sterile container. The whole amount was then rapidly centrifugalized with aseptic precautions, and some of the sediment injected into the peritoneal cavity of a guinea pig, and a smear made from the remainder, which smear was stained with phenolphuchsin and decolorized with acid-alcohol. At the expiration of about five weeks the guinea pig was killed and carefully autopsied. Sections of the liver and spleen were reserved for histologic examination; smears were also made from these organs and stained for tubercle bacilli. In the event of a tuberculous lesion being discovered in a guinea pig, the corresponding patient was examined by the genitourinary surgeon, attention being paid to the genital as well as to the urinary tract.

RESULTS.

Only 4 of the 100 guinea pigs gave evidence of tuberculosis.

CASE I.

Mr. D. Urinary sediment injected into the peritoneal cavity of guinea pig on April 5, 1916. Autopsy performed on May 15, 1916. Findings: tubercles in liver and spleen. Examination of patient showed normal genital tract. Cystoscopy revealed normal bladder with normal ureter mouths. Ureters dripped normally and catheters easily passed. The catheterized specimens, centrifugalized, showed microscopically the following: urine from right kidney, occasional erythrocytes and a few pus cells; urine from left kidney, nothing abnormal. Guinea pigs were injected with the sediment of each of these specimens on May 16, 1916, and were autopsied on July 8, 1916. The guinea pig injected with the right kidney sediment showed tuberculosis of the liver and spleen, and the guinea pig injected with the sediment from the left kidney showed no lesions.

Diagnosis.—Tuberculosis of right kidney.

CASE II.

Mr. M. Urinary sediment injected into pig on April 15, 1916. Pig autopsied on May 10, 1916, and showed tuberculosis of liver and spleen. Patient examined with the following results: both epididymides were tuberculous; the globus major, globus minor, and body of epididymis being involved on both sides; the vas deferens on the right side was distinctly beaded; on rectal examination, a diagnosis of tuberculosis of the prostate and both vesicles was made; on cystoscopic examination this diagnosis was confirmed and a tubercle was found on the floor of the internal sphincter, two more on the floor of the prostatic urethra halfway between the *veru montanum* and the internal sphincter, a high grade of posterior urethritis accompanying this; the ureter mouths were normal. Catheterized specimens from each kidney were injected into guinea pigs on May 10, 1916. Pigs killed and autopsied on June 10, 1916, with negative findings.

Diagnosis.—Tuberculosis of genital tract.

CASE III.

Mr. S. Urinary sediment injected into pig on April 20, 1916. Pig autopsied on June 20, 1916, and showed tuberculosis of the liver and spleen. Examination of the patient revealed a quite normal genital and urinary tract. Catheterized specimens from each kidney were injected into pigs on June 8, 1916. Microscopically, no abnormal elements were found in any of the bladder or kidney urines. The pigs were killed and autopsied on July 6, 1916, and showed no lesions.

Diagnosis.—Not made.

CASE IV.

Mr. L. Urinary sediment injected into pig on April 7, 1916. Pig autopsied on May 11, 1916, and showed tuberculosis of the liver and spleen. Cystoscopic examination of this patient showed the genital tract to be normal as well as the urinary tract. The ureters were catheterized, and the urine from the left kidney showed a few pus cells while the right kidney urine showed nothing abnormal. The sediment from each was injected into pigs on May 11, 1916. The pigs were autopsied on June 11, 1916, and the left kidney pig showed tuberculosis of the liver and spleen. The pig injected with the right kidney urine was normal.

Diagnosis.—Tuberculosis of left kidney.

As above mentioned, 100 patients were taken for this purpose and they were all males. The work was done at the National Jewish

Hospital for Consumptives, Denver, Colorado, and the patients were examined without regard to whether they had or had not urinary symptoms; in fact no questions were asked them. As a matter of fact only one patient did have any symptoms connected either with the urinary or genital tracts, this being the patient in Case II, Mr. M. This fact was not known by us until after the pig injected from his urine had been killed. The patients were of all stages—first, second, and third, and one was suffering from acute general miliary tuberculosis at the time. The duration of their pulmonary tuberculosis ranged from 3 months to 16 years, average about one and one-half years. The patient in case I, in this report, Mr. D., had been suffering from pulmonary tuberculosis for 15 years. The average age of the patients was 33½ years, ranging from 16 to 64 years of age.

DISCUSSION.

Patients II and III have died from pulmonary tuberculosis since this work was completed and we were unable to get consent for autopsies. Patient I left the hospital before operation could be suggested. Patient IV was too ill, being a third stage case, to advise operation and has since been lost sight of.

The fact that we failed to demonstrate tuberculosis anywhere in the genito-urinary tract of Case III may be explained in one of various ways. Since neither the bladder urine nor either of the kidney urines showed tubercle bacilli, it may be that the lesion was somewhere in the genital tract but too slight for diagnosis. Or there may have been contamination. Further, it may have happened that, at the time the pig was injected with the bladder urine, tubercle bacilli were being thrown out from a lesion somewhere in the urinary tract, but when the ureters were catheterized there were no tubercle bacilli being excreted. All of these possibilities must be taken into consideration. The patient should have been kept under observation until the diagnosis was cleared up, and we regret that this was not possible.

CONCLUSIONS.

Notwithstanding the incompleteness of some of our data, we feel that we are justified in drawing the following conclusions:

1. The normal epithelium of the human genitourinary tract does not excrete tubercle bacilli.
2. When tubercle bacilli are found in the urine a tuberculous lesion exists somewhere in the genitourinary tract. This lesion should be found, otherwise the patient should be kept under observation until it is.
3. Since the early diagnosis of tuberculosis of the genitourinary tract, particularly of the kidneys, is of the greatest importance if

the patient is to be benefited, it is advised that the urinary sediments of tuberculous patients be injected into guinea pigs as a matter of regular routine.

4. Of the 100 cases of pulmonary tuberculosis examined by us, only 4 showed the presence of tubercle bacilli in the urine, and 3 of these were proven to have tuberculous lesions in the genito-urinary tract.

5. Whereas the majority of patients suffering from tuberculosis of the kidney consult us for their bladder symptoms; and since their bladder symptoms are caused by tuberculosis of that organ, secondary to tuberculosis of the kidney; and since, in a large number of these cases, after removal of the kidney, the bladder does not heal spontaneously (we formerly supposed it did); and since there is no method of curing it: therefore, it is essential that we prevent tuberculosis of the bladder. This is possible only by diagnosing tuberculosis of the kidney before the bladder becomes affected, i. e., in the vast majority of cases, before there are any symptoms, and this in turn is possible only by the routine injection of the urine of patients suffering from tuberculosis anywhere in the body into guinea pigs every few months.

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DEPARTMENT OF PATHOLOGICAL ANATOMY.

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and Allied Hospitals, Editor

The Melanomata.

In normal circumstances the skin contains pigment-bearing cells in the Malpighian layer that are known as chromatophores. They are present in great abundance in the dark races, but, in the Caucasian, are rarely to be seen except in certain localities which are protected from light, notably in the areola of the nipple and the margins of the anus. The same variety of pigment cell occurs normally in the retina and choroid coat of the eye. The chromatophore, although a highly differentiated cell, not infrequently undergoes malignant transformation, giving rise to a tumor which is among the most vicious known—the so-called chromatophoroma, melanoma, or melanotic sarcoma. In view of the fact that the position of the chromatophore in the cellular scale is still undetermined, the place of the melanoma among the tumors is likewise debatable. Some regard the chromatophore as epithelial, others as endothelial, and still others as a connective tissue cell. Consequently the tumor to which it sometimes gives rise is variously classified as an epithelioma, endothelioma, or melanotic sarcoma. Although the question is purely of academic interest, the designation of chromatophoroma or melanoma is rather more acceptable than that of melanotic sarcoma, partly because it is non-committal, at the same time indicating the cell of origin and the fact that it is pigment bearing.

There is scarcely an individual who does not possess one or more skin moles, and every skin mole is a potential source of a malignant melanoma. The mole is a vice of development characterized, even in the resting state, by a histological grouping of chromatophores that bears a striking resemblance to a malignant tumor. In fact, the number, formation and chromatic richness of the cells in many instances are such that a given microscopic field might readily be mistaken for a tumor with established malignant qualities instead of an apparently trivial congenital malformation of the skin. If left alone the skin mole may never occasion trouble, in fact the vast majority of them maintain throughout an attitude of innocent quiet. If, however, it is located in a position where it is exposed to frequent irritation or, as not infrequently happens, it is deliberately subjected to ligation, escharotics, caustic salves, and the like, either at the hands of the host himself or of ignorant meddlers, it may develop into a growth of surpassingly vicious qualities. Moreover, malignant transformation may occur soon after interference, or it may be postponed for months or years. In one of the Bellevue Hospital cases general melanomatosis followed the removal of a skin mole after the lapse of 13 years. In other words, *the skin mole should be left to its own devices*, or, if removal is considered advisable, it should be done by a surgeon at the sacrifice of a considerable sweep of apparently healthy skin and subcutaneous tissue.

Three instructive cases of melanomata have recently occurred in the autopsy service at Bellevue Hospital, and are synopsisized as follow:

CASE I.

A man, aged 43, was admitted to Bellevue Hospital with the statement that, two years before, the left eyeball had been removed for a melanotic

sarcoma. At the time of admission the patient complained of sudden onset of severe epigastric pain, and there were board-like rigidity and great tenderness beneath the xiphoid. The abdomen was distended and tense, but palpation revealed a hard, nodular mass extending from the costal margin to the crest of the ilium. The spleen could not be felt. The skin below the left clavicle and in the left axilla showed several small, firm, non-pigmented nodules, and the lymph nodes beneath the angle of the jaw on both sides were slightly enlarged. The urine was of a smoky brown color and, after standing several hours, became definitely brownish-black. Chemical reactions for melanin were positive.

Autopsy 5,547. The body was that of a markedly emaciated man. The left eye was absent. The legs, thighs, scrotum and penis were edematous. Under the skin opposite the third dorsal vertebra, about an inch to the right of the middle line, was a walnut-sized mass which was movable. On section it was observed that the bone marrow of the ribs was diffusely blackish in color. The left pleural cavity contained about 800 c.c. of dark yellow fluid. Throughout the visceral pleura and scattered thickly through the substance of the lung were well circumscribed, blackish nodules varying in size from 2 to 10 mm. The parietal pleura was similarly sown, but to a somewhat less extent. The right parietal pleura was richly nodulated, but the lung was free. The peritracheal lymph nodes were enlarged, numerous, and blackish in color. The thyroid gland presented a pea-sized nodule in the left lobe, elsewhere it was the seat of diffuse grayish-black infiltration. The heart muscle was well preserved except for the presence at scattered intervals of a half dozen small, grayish nodules, some of which were located immediately beneath the epicardium, others deeper in the muscle substance. The liver was enormously increased in size and weighed 27 pounds. It measured 17x14x8.5 inches and reached downward to the brim of the pelvis. Distributed throughout the substance of the liver were large numbers of dark gray or blackish nodules from .1 to 4 cm. in diameter. The spleen was small and free from metastatic involvement. The peritoneum enclosed 1½ liters of brownish fluid, which, however, did not yield the reactions for melanin. In the visceral and parietal peritoneum were large numbers of blackish nodules from .5 to 1 cm. in diameter. The mesenteric and retroperitoneal lymph nodes were extensively infiltrated. The kidneys presented a few small blackish nodules lying both in the cortex and medulla. The adrenals were unchanged. The pancreas was largely replaced by blackish deposits from .5 to 1 cm. in diameter. The brain revealed no changes other than a small metastasis in the island of Reil on the right side.

Anatomical diagnosis. Primary melanoma of the left eye. Metastases in the liver, kidneys, pancreas, heart muscle, lymph nodes, ribs, lungs, peritoneum, brain and thyroid.

In addition to the several points of clinical interest, the case is noteworthy in that the cardiac muscle was metastasised and the spleen was free. Metastasis of the heart muscle is a rare event. Thus of 298 malignant tumors studied by myself at Bellevue Hospital the heart was involved but 9 times—once by a carcinoma of the duodenum, once by a spindle cell sarcoma of the humerus, once from an epithelioma of the esophagus, once from an adrenal hypernephroma and once in a case of generalized melanomatosis of much the same type as the one recorded above. In the same series of 298 cases the spleen was metastasised but 16 times, or in 5.3 percent. In 7 of the cases the metastases in the spleen were derived from cancer of the stomach, in 3 cases the primary growth was in the breast, in 1 case there was a primary hypernephroma of the kidney, in 1 case a primary carcinoma of the liver, in 1 case a cancer of the cecum and in 1 case of the jejunum. In 5 cases of

generalized malignant tumor dissemination, on the other hand, the spleen was entirely free from invasion. Facts of this description would seem to indicate that the spleen maintains an inimical attitude toward the growth of tumor cells.

CASE II.

The patient was a man, aged 32 years. He was a laborer by occupation and was long accustomed to carry heavy loads, always on the left shoulder. Early in 1912 he noticed a small nodular mass over the left shoulder. The mass grew progressively larger and finally ulcerated. In 1916 the growth was removed surgically. It recurred within a month and grew rapidly. Within 6 months multiple nodules had appeared in various parts of the body, some bluish, others colorless. Upon admission to Bellevue Hospital physical examination revealed, in addition to the nodules just noted, a small, rounded growth beneath the scalp of the left parietal region together with numbers of blackish nodules over the left malar bone and the forehead. Ophthalmoscopic examination showed bilateral papillitis, but no indication of tumor growth. The urine was negative for melanin. The patient complained of violent, continuous headache and finally lapsed into coma and died.

A further note of interest is furnished by Dr. White, of the Hackensack Hospital, who operated upon the patient, removing from the left shoulder region a 38 calibre bullet. The patient, however, stated that he had no recollection of ever having been shot.

Autopsy 5,497. The body was that of an ill-nourished man. Beneath the skin of the entire body were dozens of small, irregularly outlined, brownish or blackish nodules, some of which were adherent to the skin or deeper structures, others of which were freely movable. There was a large, lobulated, blackish ulcerated growth over the region of the left shoulder. On opening the body great numbers of small pigmented nodules were found in the subcutaneous tissues and in the muscles, particularly in the serratus magnus and the pectorals and recti. Lying in the parietal peritoneum near the brim of the pelvis were two small pigmented nodules, one of which extended directly into a vein, causing neoplastic thrombosis. The lungs and pleura were riddled with metastases, both layers of the pericardium were similarly strewn and the superficial layers of the heart muscle contained a half dozen small nodules. Immediately beneath the endocardium of the right heart were a few small blackish deposits. The left heart was free. The liver was extensively metastasised, some of the nodules being pigmented, others whitish in color. The spleen weighed 375 grm. and presented three large blackish deposits in the pulp. In the submucosa of the stomach, duodenum and lower ileum were a few blackish nodules, the mesentery was richly strewn with similar deposits, the abdominal lymph nodes were extensively metastasised, the pancreas was largely replaced, both adrenal medullae were infiltrated, the kidneys were extensively involved and the marrow of the lumbar vertebrae was invaded by pigmented tumor tissue. Beneath the scalp of the right parietal region was a large, discrete pigmented growth. The underlying bones were free. The dura and falx presented small number of nodular projections and the pia arachnoid was likewise involved. Innumerable nodules were scattered throughout the substance of the brain and, in several places, the cerebral veins were the seat of neoplastic thrombosis. The eyes were not involved.

During life the patient was carefully questioned as to the existence of a skin mole in the left shoulder region corresponding to the site of the original growth, but no such history was obtainable. No doubt, however, he was a somewhat careless observer, since he had no recollection of having been shot, although a bullet had been removed by operation from the tissues of the shoulder region. It is quite possible that a mole had been present, but had

escaped notice, and that constant irritation resulted in malignant transformation. On the other hand, it is equally possible that irritation of the skin with its embedded bullet was responsible for the growth. The case is furthermore interesting as an example of generalized tumor dissemination following ulceration of a metastatic deposit into a vein, with secondary involvement of tissues which are not commonly metastasized, namely, the spleen and heart muscle.

CASE III.

The patient was a man, aged 30 years, who was admitted to Bellevue Hospital complaining of partial paralysis of the right side of the body, including the muscles of the face. He was markedly emaciated. Careful questioning failed to reveal a history indicative of the previous existence of a skin mole, and no scar, corresponding to the removal of such a growth, was detected.

Autopsy 5,465. On opening the abdomen about 700 c.c. of fluid were removed. The peritoneum and omentum were riddled with blackish nodules varying in size, scarcely an appreciable interval existing between many of them. On opening the jejunum numbers of small, blackish tumor nodules were found and, further down in the same portion of the intestine, similar but larger growths came into view. The liver contained numbers of metastatic deposits. The retinæ were free. The brain contained a large pigmented mass just anterior to the rolandic fissure on the left side. The choroid plexus was normal.

The point of commencement of the growth in this case is its chief interest. The skin and retinæ may be excluded, the former with a degree of reservation, however, but the latter definitely. The question thus revolves about the possibility of origin from misplaced pigment cells in the walls of the jejunum. That such cells may occur and that melanomata may arise from them is shown by the fact that primary pigmented tumors of the type under consideration have been demonstrated in the common bile duct, in the walls of the rectum, in the ovary, and in the meninges of the brain. In this case the origin of the tumor in the jejunum is not to be denied.

Finally, in connection with the general subject of melanomata, I am permitted to record two examples which, as far as I am aware, are unique. In one of them, the patient, a woman about 30 years of age, was operated upon by Dr. Joseph A. Blake, because of symptoms of intestinal obstruction. The patient stated that, some months previously, a pigmented mole had been removed from the anterior abdominal wall. Dr. Blake's operation revealed a myofibroma of the uterus, the growth was removed and sent to the Laboratory of Surgical Pathology at Columbia University. It was there sectioned and two small pigmented nodules were found in its interior. Microscopic examination of these nodules by Drs. C. Clark and John E. McWhorter showed that they were metastatic melanomata. The patient has since died of generalized pigmented growths.

In a second case, the patient was operated upon in Bellevue Hospital by Dr. Wm. E. Studdiford, who removed a large cystadenoma of the ovary, microscopic examination of the walls of which showed the presence of metastatic deposits of melanoma. The patient stated that she had been previously operated upon and a growth removed from one eye.

Hodgkin's Disease.

By some pathologists Hodgkin's disease is regarded as an infective granuloma. Thus far numerous and varied attempts to establish a causal relationship between it and different micro-organisms have failed to substantiate this view. By others it is looked upon as a primary neoplastic process. This theory has also failed of general acceptance. It is to be disregarded, I think,

if for no other reason than that tumor metastases are dominated by a single type of cell, namely, the vegetative cell of which the parent growth is composed. In Hodgkin's disease, on the contrary, the lesions in the lymph nodes and elsewhere are made up of a number of different cells and, in order to fall into the category of metastases, the visceral deposits would necessarily have to reach the new tissue in the form of cell composites and proliferate as such. The only alternative conception is manifestly absurd, namely, that a single type of cell, when transplanted, reproduces a cell complex. Neither phenomenon is known in pathology, as far as I am aware.

It is not to be questioned, however, that Hodgkin's disease is capable of malignant transformation, but in these circumstances malignancy is shown either by direct infiltration and destruction of neighboring tissues, or by transplantation and proliferation of a single type of cell. In the latter event the secondary growth is dominated by the type of cell transplanted and the histology of the nodules thus formed is totally different from that of the lesions in Hodgkin's disease.

Hodgkin's disease is a process which demands lymphoid tissues as a prerequisite to development. In the nodes and elsewhere hyperplasia of lymphoid cells is the first detectable histological change. As development proceeds, the histological picture assumes an individuality due to the presence among the lymphoid cells of elements morphologically identical with cells normally encountered in the bone marrow. I prefer to believe that Hodgkin's disease is primarily neither an infective nor a neoplastic process, but a systemic disease which partakes of the nature of both and which expresses a predilection for lymphoid tissues, giving rise to multiple foci of growth in response to the same provocative agent.² The provocative agent, which is probably a toxin, initiates hyperplastic changes in the lymph nodes and in auxiliary lymphoid collections in various tissues—the liver, kidneys, lungs, thyroid, adrenals, serous membranes, etc., together with disturbances in the bone marrow, attended by discharge of large mononuclear, nongranular cells of the type of lymphocytes, eosinophiles, eosinophilic myelocytes, and myeloid giant cells. These cells are thrown into the circulation at intervals and are filtered out by the hyperplastic lymphoid tissues, or deposited in them in response to chemotactic attractions, fibrotic changes in the recipient tissues occurring purely as a local inflammatory reaction. This interpretation is borne out by several facts. For example, in a case of myelogenous leukemia observed post mortem at Bellevue Hospital, the subject presented enlarged inguinal and retroperitoneal lymph nodes, microscopic examination of which showed the undeniable histology of Hodgkin's disease, while numerous myeloid giant cells were found lying free in the capillaries as well as among the cells in the lymph nodes. Flexner's³ observations on lymphotoxins and myelotoxins have shown that injection of these substances into certain animals is followed by hyperplasia of the lymphoid tissues throughout the body and by increase in the nongranular, mononuclear cells, the granulated leucocytes, and the multinucleated giant cells of the bone marrow. Exactly similar changes occur in the same situations in Hodgkin's disease, so that it appears to me to be probable that, in this condition, the causative irritant divides its activity between functionally related structures, i. e., the lymphoid tissues and the bone marrow. The marrow cells are discharged into the circulation and filtered out by the hyperplastic lymph nodes, in this way providing an histological picture which partakes of the cellular characteristics of both structures. This interpretation is furthermore substantiated by myeloid transformation of the spleen, liver, and other organs in various pathological conditions, in which event the myeloid foci are apt to bear a striking similarity to the changes occurring in the same situations in Hodgkin's disease.

The first detectable manifestation of Hodgkin's disease is most frequently to be found in the cervical lymph nodes. At other times, however, the cervical lymph nodes escape altogether or are involved secondarily and to a comparatively limited extent. In fact, the disease may involve practically any lymphoid tissue in the body, and cases of so-called primary Hodgkin's disease have been described in the peribronchial, axillary, inguinal, and abdominal lymph nodes, and in the spleen. In addition there is a form of Hodgkin's disease that is first exhibited as an enlargement of the lymphoid remains of the thymus gland. Two such cases are recorded in the literature. A third was recently encountered in the autopsy room at Bellevue Hospital.

In Yamasaki's case⁴ of thymic Hodgkin's disease the subject was a woman, aged 38 years, in whom, at autopsy, there was found a large growth in the upper anterior mediastinum that corresponded in shape with the thymus gland. The growth was attached to the right lung and penetrated the pericardium at several points. The sternum was eroded and the left innominate vein and vena cava were invaded. The lymph nodes in the neck and in the region of the stomach were enlarged to the size of walnuts.

In a case observed by myself⁵ at the New York Hospital some years ago the subject was a woman, 56 years of age. She complained of persistent dyspnea, palpitation of the heart and an annoying cough attended by the expectoration of large quantities of frothy material. The lower extremities were edematous, as were the right arm and the right side of the neck and chest. Numerous enlarged, firm, discrete nodules were palpated in the suprasternal notch and both supraclavicular regions. The left pleural cavity was distended by fluid. No tubercle bacilli were detected in the sputum.

At autopsy it was found that the anterior mediastinum was occupied by a mass corresponding in outline to the shape of the thymus gland. The growth pushed the heart downward and to the left and overlapped the upper third of the pericardium. It measured 18x11 c.m. The mass extended upward into the suprasternal notch, where it invaded and replaced the lower pole of the right lobe of the thyroid gland. The trachea was compressed, displaced, and its walls were invaded by new growth. Microscopic examination of the thymic tumor and its extensions into the thyroid and trachea revealed the presence of innumerable lymphoid cells among which were numbers of myeloid giant cells and eosinophiles, the whole supported in a delicate reticulum of connective tissue.

In the case recently observed at Bellevue Hospital the patient was a woman, 32 years of age, who was admitted complaining of "asthmatic" attacks of two years' duration. She stated that during the last year breathing became so difficult that she had to maintain the erect posture at all times. Physical examination revealed edema of the upper extremities without signs of venous congestion. Percussion of the chest anteriorly and to the right disclosed marked dullness. The x-ray report was to the effect that the area of pulmonic illumination on the right side was greatly diminished.

Autopsy 5,501. The body was that of a well nourished, well developed female. There was marked edema of the chest wall and slight edema of the legs. On opening the thorax an enormous tumor came into view occupying the anterior mediastinum in the region of the thymus gland. The mass measured 25x18 c.m., and extended downward, obliterating the right pleural cavity and compressing the lung. Both lungs were studded with innumerable large and small nodules of identical appearance with the growth in the thymic region. The peribronchial lymph nodes were enlarged.

Microscopic examination of the growth in the thymic region showed the presence of vast numbers of lymphoid cells, scattered among which were large, mononuclear, non-granular cells and myeloid giant cells together with

a few eosinophiles. Microscopic examination of the nodules in the lungs, however, revealed foci which were purely lymphocytic, large mononuclear and myeloid giant cells being absent. In other words, the histology of the original growth was typical of Hodgkin's disease, while that of the nodules in the lung indicated that the lesion had undergone neoplastic transformation with the assumption of an histology indistinguishable from that of lymphosarcoma.

That Hodgkin's disease may first display itself in regions other than the neck is further exemplified by the following case:

The patient, a man, aged 32, was admitted to Bellevue Hospital complaining of dyspnea and of pain in the upper abdomen. The superficial lymph nodes in the axillae and groin were somewhat enlarged and the spleen was palpable. The cervical nodes were not involved. The face and neck were cyanotic and ascites was marked.

Autopsy 5,419. On opening the thorax the right lung was found to contain a half dozen firm, whitish masses from $\frac{1}{4}$ to 1 inch in diameter. The peribronchial lymph nodes were moderately increased in size, grayish white in color, and firm. The liver weighed 3,480 grm. and contained numerous small grayish deposits. The spleen was greatly enlarged and weighed 840 grams. On section the pulp was replaced at frequent intervals by grayish foci of firm consistence. The abdominal lymph nodes were noticeably increased in size and enormously increased in number throughout a wide distribution. They were discrete, firm, and grayish in color. The kidneys, pancreas and stomach were partially embedded in collections of enlarged nodes and the abdominal aorta was moulded into a solid mass of like formation. The mesentery was thickened to the extent of nearly 3 inches on account of the presence in it of huge numbers of enlarged, discrete lymph nodes. The microscopic changes in the several nodes examined were characteristic of Hodgkin's disease.

Skin Changes in Hodgkin's Disease.—A considerable percentage of all cases of Hodgkin's disease is attended by changes in the skin. These may be divided into two groups, one, associated with histological alterations not to be distinguished from those in the lymph nodes and viscera, the other consisting of a number of independent, coincident lesions and symptoms, such as persistent pruritis, bronzing of the skin, urticaria and diffuse exfoliating erythrodermia. Of 7 cases of Hodgkin's disease observed post mortem at Bellevue Hospital one was attended by cutaneous lesions. The subject was a male, aged 20, who presented extensive changes in the abdominal and inguinal lymph nodes, the liver, spleen and lung. The skin of the face, hands, legs and feet was dry, roughened and desquamating, while on the face, in the axillae, and about the elbows there was diffuse brownish pigmentation.

According to the work of Dr. Frank Fraser,⁶ in the pathological laboratories at Bellevue Medical College, *mycosis fungoides* is not uncommonly associated with changes in the skin and lymph nodes of such a histological character as to make it difficult, at times impossible, to distinguish it from Hodgkin's disease. In fact, certain students of *mycosis fungoides* have advocated the view that it is a cutaneous form of Hodgkin's disease. Fraser states, however, that Hodgkin's disease as a complement of *mycosis fungoides* is present in a certain number of cases only, and that many cases clinically identified as *mycosis fungoides* are not attended by changes in the lymph nodes nor by histological alterations in the skin that bear any resemblance to those of Hodgkin's disease. Consequently there is grave doubt as to whether *mycosis fungoides* bears a direct relationship to Hodgkin's disease, or whether it is an independent affection which, like several other skin lesions, is occasionally superimposed. If the latter is true, it is difficult to explain why *mycosis fungoides*, when associated with Hodgkin's disease, should present an identical

histology, and why it should equally often present a different histology when it occurs independently of Hodgkin's disease. One is thus confronted with the alternative view that *mycosis fungoides* is not a histological entity, but a lesion whose variable clinical manifestations have caused dermatologists erroneously to group a series of histologically divergent skin changes under the descriptive title of *mycosis fungoides*.

The Treatment of Hodgkin's Disease.—Doubtless criticism of the therapeutics of Hodgkin's disease comes with ill grace from the pathologist, and yet an acquaintance with the pathology of the condition does not materially interfere with one's conception of applicable measures of treatment. Therefore, I venture the opinion that the use of vaccines prepared from diphtheroid bacilli, as recommended by Bunting and Yates, is a waste of time, since diphtheroid bacilli may be isolated from a variety of tissues, normal and abnormal, particularly if one's bacteriological technic is indifferent. The occurrence of diphtheroid bacilli in the lymph nodes in Hodgkin's disease is without significance as far as the etiology of the lesion is concerned. On the other hand, from histological studies of a case of Hodgkin's disease systematically treated by x-rays, I gather that this method is not without value. In the case in question the patient, a man, aged 39 years, presented enlargement of the cervical and abdominal lymph nodes and of the spleen, which weighed 700 grm. The liver contained several whitish nodules. Microscopic examination of the cervical nodes and spleen, both of which had been subjected to x-ray treatment, revealed extensive thickening and hyalinisation of the connective tissues of much the same character as that occasionally encountered in isolated lymph nodes which have not been exposed to radiation, but which have undergone spontaneous healing.⁵ Between the hyaline bands in the treated tissues were still to be seen lymphoid cells and, occasionally, myeloid giant cells, large mononuclear cells, and eosinophiles. In the liver, which had not been subjected to radiation, the whitish foci described were found to be made up of richly cellular islands of characteristic histology, without the slightest suggestion of overgrowth of connective tissue. In other words, radiation appears to be a therapeutic agent of value in the treatment of Hodgkin's disease, showing a tendency to bring about the same sort of changes as are sometimes encountered in cases of spontaneous healing. That radiation is capable of slowing the progress of Hodgkin's disease, at least in certain cases, seems to be assured, but that it can arrest it is highly doubtful, since the effect of the x-ray is purely local, while the disease is a systemic process.

The surgical treatment of Hodgkin's disease is open to question. There are undoubtedly instances in which operative interference prolongs life by the relief of mechanical interference with function. At other times surgical measures are followed by disastrous results in the form of rapid increase in the progress of the disease. The institution of surgical interference, therefore, is a problem which requires exalted judgment. After surgery, however, radiation of the field of operation is strongly indicated, since it is known that Hodgkin's disease demands lymphoid hyperplasia as a prerequisite to development and that the x-ray is useful in discouraging proliferation of lymphoid tissues.

I wish to acknowledge, with many thanks, valuable assistance given by Dr. H. M. Ray, of Bellevue Hospital.

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⁶ To be published in forthcoming number of Journal of Cutaneous Diseases.

MISCELLANEOUS

Synthetic Alcohol for Commercial Purposes.

The synthesis of alcohol from its component elements would afford great relief to a country like Switzerland, dependent for its usual supply of alcohol on outside sources and naturally loath to employ for the purpose any of its scanty stock of starch. Dr. Fleissig, apothecary to the Town Hospital in Basle, tells how this problem has been solved, although, unfortunately, its complete technical application will require 18 months to work out. Calcium carbide is now produced in Switzerland to an annual amount of 70,000 tons, and is the starting-point of the synthesis. The acetylene evolved from it combines with a molecule of water to form acetaldehyde in the presence of a catalyst such as mercuric sulphate. Two additional atoms of hydrogen, produced electrolytically, unite with the aldehyde to form alcohol under the influence of certain metals as nickel, platinum, or palladium. A ton of alcohol can thus be obtained from 2 tons of carbide and 500 cubic meters of hydrogen, requiring, apart from electrical energy, only $2\frac{1}{2}$ tons of coal and 4 tons of chalk. Switzerland's average requirement of 10,000 tons of alcohol would therefore demand the import of only some three-quarter million francs' worth of coal, while the ready-made alcohol at present costs 4,000,000 francs. The process requires, of course, a large amount of electrical energy—a ton of alcohol demands 11,000 kilowatts to produce—but this is readily supplied by the "white coal" available in the water-power of Europe's central plateau.—*The Lancet*, August 18, 1917.

The Soldier and the Cigarette.

The question whether cigarette-smoking does material harm to health has come into greater prominence now that the habit is almost universal amongst our troops. There can be little doubt that the soldier looks upon the cigarette as part of his kit, as affording him a source of genuine comfort in strenuous times and as increasing the pleasures of relaxation when his nerve-racking duties are for the time in abeyance. Everyone knows that tobacco-smoking has been associated from very remote times with phases of relief from stress and intense activity; the aborigines of America smoked the pipe of peace as much for this cause as to lend gravity to a *pow-wow*. The practice of smoking provides unquestionably a mental anodyne, and that fact alone accounts for its universality in the present bitter days. It must be remembered, however, that tobacco-smoking is a species of drug habit, although perhaps a mild one if we leave out the question of excess, and that the continual drawing of tobacco smoke into the mouth or, worse, deeper into the respiratory tract, introduces toxic risks. Hygienically, of course, air that contains poisonous products of combustion would be condemned as departing from a standard of purity demanded by healthy respiration. Moderate smokers, however, as a rule, show no depreciation of normal health. It has been suggested that there may be a relationship between cigarette-smoking and the "soldier's heart." In a careful inquiry into this subject, undertaken at the instance of the Medical Research Committee by Dr. John Parkinson and Dr. Hilmar Koefod, it is concluded that while excessive cigarette-smoking is not the essential cause in most cases of "soldier's heart" it is an important contributory factor in the

breathlessness and præcordial pain of many of them. The immediate effect of cigarette-smoking upon the circulatory system and upon the breathlessness of exertion was observed in 30 smokers, of whom 20 were cases of "soldier's heart" and 10 were healthy soldiers. All the subjects were cigarette smokers. Each subject smoked either four or five cigarettes during a period of 40 minutes. A demonstrable effect was recorded in 17 of the 20 patients, but it is interesting to note that the 3 unaffected were non-inhalers. Nine of the 10 controls, all inhalers, were influenced in the same fashion, though not to the same degree. Generally the observations show that in health the smoking of a single cigarette by a habitual smoker usually raises the pulse-rate and blood pressure perceptibly; and these effects are a little more pronounced in cases of "soldier's heart." Moreover, the smoking of a few cigarettes can render healthy men more breathless on exertion, as was shown to be the case in a large proportion of the patients under examination. The results show clearly that the soldier should be warned against inhaling, and, of course, he should avoid excess.—*The Lancet*, August 18, 1917.

BOOK REVIEWS.

OBSTETRIC AND GYNECOLOGIC NURSING. By Edward P. Davis, A. M., M. D., F. A. C. S., Professor of Obstetrics in the Jefferson Medical College, Philadelphia; Obstetrician to the Jefferson Hospital, etc. Fifth edition, thoroughly revised. Philadelphia: W. B. Saunders Company. 1917. Price, \$2.

The little volume appears in its fifth edition, thoroughly revised, and, by the addition of some matter, slightly enlarged. It is safe to say that it will continue to enjoy its well-deserved popularity as a text for training schools for nurses.

DIAGNOSTIC SYMPTOMS IN NERVOUS DISEASES. By Edward Livingston Hunt, M. D., Assistant Professor of Clinical Neurology, College of Physicians and Surgeons, the Medical Department of Columbia University, in the City of New York, etc. Second edition, revised. Philadelphia: W. B. Saunders Company. 1917. Price, \$2.

A book in which the reader can find the salient points and leading symptoms of the principal nervous diseases without the laborious search involved in consulting the larger text-books, filling a definite need. In Hunt's hand-book each chapter is devoted to the consideration, not of a disease, but of a symptom, such as paralysis, tremors, vertigo, and the like. This increases its value as a diagnostic guide, the practitioner being able to look up the significance of the signs and symptoms as he finds them. For a systematic description of the diseases he will have to go elsewhere.

CARE OF PATIENTS UNDERGOING GYNECOLOGIC AND ABDOMINAL PROCEDURES BEFORE, DURING AND AFTER OPERATION. By E. E. Montgomery, A. M., M. D., LL. D., F. A. C. S., Professor of Gynecology in Jefferson Medical College, etc. Illustrated. Philadelphia and London: W. B. Saunders Company. 1916. Price, \$1.25.

The novice in the operating room, whether intern or nurse, will find this little volume a most valuable and welcome aid in the ever-puzzling problem of preparing patient and instruments for a definite operation. In the way of very mild criticism it may be said that the nurse in this well-illustrated book probably will find more than she need to know or even could understand. Another objection the nurse might well make is that she will have to clean many more instruments than have been required if in every instance she follows strictly the instructions of the author.

REST, SUGGESTION, AND OTHER THERAPEUTIC MEASURES IN NERVOUS AND MENTAL DISEASES. By Francis X. Dercum, A. M., M. D., Ph. D., Professor of Nervous and Mental Diseases in the Jefferson Medical College, Philadelphia, etc. Second edition. Philadelphia: P. Blakiston's Son & Co. 1917. Price, \$3.50.

In his treatment of nervous disorders the general practitioner is still far too much wedded to the use of drugs. This is not always because of an undue faith in the efficacy of bromides, valerian, strychnine and the like, but because of lack of knowledge and skill in the use of physiologic methods. In no modern book are these methods more clearly and sanely discussed than in this new edition of Dercum. The importance of rest, but not too much rest; of exercise, but not too much exercise, are clearly set forth. The chapters on psychotherapy are clear, sane, and conservative, and totally devoid of the mysticism that

mars so many presentations of this subject. The book makes interesting reading, and should be welcomed by all who are trying to handle their neurotic patients in a modern and rational manner.

A TEXT-BOOK ON THE PRACTICE OF GYNECOLOGY FOR PRACTITIONERS AND STUDENTS. By William Easterly Ashton, M. D., LL.D., Professor of Gynecology in the Graduate School of Medicine of the University of Pennsylvania, etc. With 1,052 new line drawings illustrating the text by John V. Alteneder. Sixth edition, thoroughly revised. Philadelphia and London: W. B. Saunders Company. 1916. Price, cloth, \$6.50; half morocco, \$8.

The thoroughness with which in each edition of this splendid work all the latest editions to the diagnosis and treatment of gynecologic diseases are reflected is undoubtedly one of the important features explaining the popularity of this volume both with the students and the practitioner. Of the many textbooks of gynecology, apparently no other is better adapted to their special need for a work which will offer clear and concise information in systematic form concerning any gynecologic question.

OBSTETRICS—A TEXT-BOOK FOR THE USE OF STUDENTS AND PRACTITIONERS. By J. Whitridge Williams, Professor of Obstetrics, Johns Hopkins University; Obstetrician-in-Chief to the Johns Hopkins Hospital, Baltimore, Md. Fourth enlarged and revised edition. With 17 plates and 685 illustrations in the text. New York: D. Appleton & Co. 1917.

This work does not require a detailed description. It is written by an experienced teacher and, we may add, for an intelligent student. The characteristic feature of this textbook undeniably lies in the emphasis placed on the scientific side of obstetrics, which, however, does not mean that the practical aspects are inadequately presented. For the ideal student this is the ideal text-book, and a teacher of obstetrics looking over this new edition can hardly suppress the wish that the new class he is to face in a few weeks will be made up only of students who will sincerely appreciate a text-book of this type.

GLAUCOMA—A HANDBOOK FOR THE GENERAL PRACTITIONER. By Robert Henry Elliott, M. D., B. S. (London), Sc. D. (Edinburgh), F. R. C. S. (England), etc., Lieutenant-Colonel I. M. S. (retired); Late Superintendent of the Government Ophthalmic Hospital, Madras, etc. New York: Paul B. Hoeber. 1917. Price, \$1.50.

In the preface Colonel Elliott states that this little book is but the epitome of a much more exhaustive treatise which he hopes to publish at a more propitious time—i. e., after the war. The larger work will be addressed to the scientific ophthalmologist; the present book is expected to appeal to the busy general practitioner. It aims (1) to aid him in the recognition of the disease, (2) to teach him to make sure of his diagnosis in case of doubt, and (3) to indicate present tendencies in treatment. Matters in controversy have, of necessity, been omitted. The author admits that "a certain amount of dogmatism has been inevitable"—a virtue, not a fault, in a manual of this character.

One hesitates to take issue with Colonel Elliott on any glaucoma question yet the reviewer, in common with many American ophthalmologists, finds himself in disagreement with the statement (page 36), myotic treatment is useless in simple glaucoma." Indeed, it is precisely in glaucoma simplex (as the disease is conceived in this country) that myotics find their greatest field of usefulness. Posey and others have shown in how large a percentage of cases miotic treatment, conscientiously carried out, will arrest or at any rate greatly retard the disease. The great difficulty is, of course, to secure the right kind of cooperation from your patient—often an impossibility in hospital work.

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EDITORIAL.

MALINGERING CIVIL AND MILITARY.

Mori,¹ in an article entitled, "On Certain Factitious Affections of Limbs Mistaken for Results of War Wounds," precedes a somewhat prolix casuistic by some interesting observations on malingering in general and on the difference, moral and physical, between civil and military simulation of disease.

He reviews the history of simulation, designed to permit of escaping military service, from the concealment of Achilles among the women to the present time. The art of malingering is shown rising to its zenith in the time of the Napoleonic wars, and its decline is traced through the nineteenth century to our days.

Among the cardinal reasons for this diminution, Mori finds that the improvement in the conditions of military life, the changes in the nature of military discipline and the methods of enforcing it, the growth of democratic ideas, with the correlated universal liability of service, have been reinforced by the improvement in the means of diagnosis.

The malady has passed from an epidemic to a sporadic manifestation.

With the rise, however, of legislation providing compensation for industrial accidents and sickness insurance, malingering has found a new reason for its existence in civil life, where formerly its only field of exercise was in the profession of beggary.

Malingering calculated to procure exaggerated or entirely unmerited compensation in civil life, when it takes the form of self-inflicted trauma or of the maintenance of an injury, is always such in localization as to decrease or abolish the earning capacity of the worker. Self-inflicted injuries among soldiers on the contrary are almost invariably of such a character as to incapacitate from con-

¹Mori: Di alcune affezioni provocate degli arti considerate come postumi di traumi di guerra (Riforma Medica, March 17 and 24, 1917).

tinued military service but not to interfere notably with the earning power.

This simulation, with the purpose of drawing undeserved benefits, is, for Mori, sharply distinguished morally from military malingering and, in particular, from that kind of malingering with which his case-reports deal i. e., the maintenance of incapacity to return to the firing line by those who have already experienced its trials.

Civil malingering is a form of fraud strictly comparable with other fraud. It is, like most other crimes, a particular manifestation of an anti-social state of mind which, in other conditions, would have produced other delicts.

The kind of military malingering which Mori considers is, on the contrary, in part at least a reaction to the abnormal conditions of war in persons of otherwise normal conduct and character. It is extremely common among those who have suffered wounds on the firing line and it not infrequently occurs in men who have especially distinguished themselves by their valor.

Mori, therefore, argues that malingering of this kind should be treated medically and sympathetically, and not in a mechanical, penal way.

He has no such tenderness for the civil malingerer, in whose case he calls for the utmost severity of the law, not only because he regards such an act as a criminal offense, but also because he looks to the retarding effect such practices have on social welfare legislation, exaggerated as the prevalence of them always is by the enemies of progress.

From these considerations it follows that, in civil life, such lesions, real or pretended, are usually found in the upper extremities, while in civil life, they are localized in the legs.

* * * *

The lesions dealt with in the casuistic part of Mori's article are all of one kind, i. e., edema and difficulty of joint movement produced by a constricting band maintained proximally to the joint. In almost every case there had been a real war wound or a sprain of the affected limb.

The following are the characteristics by which, according to Mori, one may recognize the true nature of such a factitious edema:

1. The edema is confined to the part of the limb distal to a more or less sharply defined area of constriction and its distribution does not correspond with any anatomical determining structure.
2. The edema occupies the whole limb distal to the constriction, being most marked around the joints. In certain situations, however, notably the knee, where special conditions of circulation exist, a band on each side of the joint causes an edema almost limited to

the neighborhood of the joint and in any case much more developed there.

3. The skin of the edematous area is red or cyanosed, while the skin of the constricted area is atrophied and not infrequently abraded and scabbed. The intensity of these skin changes is a function of the time during which the constriction has existed.

4. No pathological condition is found which would furnish a satisfactory explanation of the existence of the edema.

5. The edema, instead of being increased by the daytime use of the limb, is decreased thereby, and measurements taken at night are less than those of the morning.

This characteristic may be elicited even when the patient has nothing with which he may bind the limb during his stay in bed. In such cases it has been found that the edema once established by long-standing constriction can be maintained by a suitable posture or by pressure of the other limb or foot.

The indications for treatment are obvious. Rest, a raised position incarceration of the limb in such a manner as to prevent access by the patient.

Mori tells us that in this way edemas, which had duped his colleagues for months, disappeared in a few days.

AFTER THE WAR: THE ARMY PHYSICIAN AND STATE MEDICINE.

A great number of the physicians who have been called to active service with or for the armies are graduates of first-class schools, with the best academic training and with some experience of clinical practice. Nevertheless, many of them are comparatively young and have torn up the roots of any practice or other connections that they may have begun to establish. It is well, therefore, to consider from now what will become of these men when the war is over.

They cannot pick up the threads of their former work with any ease; things will not be again for them quite as they were "before the war." What will they be willing to do? What opportunities will present themselves for them?

If we analyze their situation as it will be on the conclusion of peace we shall find that the most obvious difference will be that they have added to their academic training and their clinical knowledge a practical and theoretical acquaintance with Preventive Medicine. They will have learned the essentials of public health administration as well as the field work associated therewith. This will have been presented to them in a didactic form in the training camps and under conditions of the most intensified practical application with the armies,

So much for the knowledge and experience that they will have acquired.

But there is a much more important change that will have taken place and that is one in their attitude towards their own future careers. It is notorious that contact with collective effort, under administrative discipline, leads to a state of mind which may, without any intended depreciation, be called that of the salaried official.

Many a young man, whose original aim in his profession was to follow the clinical branches of it and, in a more or less individualistic way, carve out therein a personal career, will find the influence of his army experience such that he will be willing and, indeed, desirous to take up some public position and to make a career in institutional or state medicine. Better material for our future health officers, will never be available, nor a more favorable frame of mind.

But, in order that this seed may grow and fructify, it will be necessary to have the ground prepared.

While the movement towards state medicine is fairly generally recognized as being still on the rise, it is necessary for those who remain behind and who have influence over the tendencies over public opinion and policies, to bull this market. The desirability in principle of the whole-time medical officer meets few contestants, and those chiefly interested parties. But among those arguments which have been adduced against the present appointment of such whole-time officers, one of the commonest has been that the supply of really competent men willing to take such posts is woefully deficient. This is, first, because academic and practical training for the career of health officer has not been sufficiently developed in the country and, secondly, because the cream of the graduates have preferred to enter the clinical branches of the profession, urged thereto by individualistic tendencies and by the greater potential rewards.

The war has removed both these objections. As I have said, at its close, a large number of first-class young physicians, with ample administrative experience and sufficiently recent academic training, will be available for public services of the country. That psychological moment may be short; we must be ready to seize it. Therefore, during the intervening time, action must be taken to provide whole-time health officerships, and other analogous posts in which these men may find an adequate career.

As soon, therefore, as the present acutely congested state of public business permits of its being done, the local health authorities should meet in conference with delegates from the United States Public Health Service to elaborate some common scheme of action throughout the country.

The matter being evidently well within the police power is un-

questionably one for each state to legislate for. But the great unity of sentiment and action produced by the war cannot fail to provide a propitious moment for a common effort.

ANTI-NEURITIC AND ANTI-SCORBUTIC VITAMINS.

The rationing of enormous armies in regions not capable of providing any considerable part of the food required renders the question of sterilized and dried foods of immediate and pressing interest. Recent advances in pathological chemistry have shown that, in addition to the standard contents of a diet—carbohydrates, proteins, fats, water and mineral matters—there are subtler substances essential to growth and to the maintenance of healthy life. The deprivation of the latter group of these vitamins is believed to be the cause of beriberi and probably of scurvy, while there are considerable grounds for the belief that some such factor plays a role in the etiology of pellagra and of rickets.

It is now a familiar fact that the feeding to fowls of polished rice, as an exclusive diet results in the production of a polyneuritis having many characters in common with that which is the characteristic pathological condition of beriberi. Similarly, scurvy can be produced in guinea pigs by feeding them with dry or overcooked food.

The interest of the distribution among food stuffs, especially those suitable for the rationing of armies, of accessory factors necessary for the prevention of neuritis and of scurvy has caused a research on this subject to be made for the British Government at the Lister Institute, the results of which are embodied in an article¹ published in the *Journal of the Royal Army Medical Corps* for August last.

Though neither anti-beriberi nor anti-scorbutic vitamin is detectable by other than biological experiments, curative and preventive, they can be shown to be different and differently distributed in foodstuffs.

Anti-neuritic vitamin was found by the authors of this report in every natural foodstuff they examined. It is particularly abundant in cereals and pulses. In the former, it is found chiefly in the embryo and to a less extent in the bran. It is, therefore, absent from modern patent flour and from polished rice. Fresh eggs, whether of fish or birds, and yeast constitute other important sources of this accessory factor. Anti-neuritic vitamin resists drying and heating to the boiling point of water for two hours.

Anti-scorbutic vitamin is present in actively living vegetable tis-

¹Chick, H., and Hume, N. E.: The Distribution Among Foodstuffs (Especially Those Suitable for the Rationing of Armies) of the Substances Required for the Prevention of (a) Beriberi and (b) Scurvy. (*Jour. R. A. M. C.*, August, 1917, p. 121).

sues, and is also found in animal tissues, but to a much less extent. Fresh vegetables, therefore, are the most important and available food to furnish this factor. But it is also contained in vegetable juices which have not been heated. All dry foodstuffs are deficient in anti-scorbutic vitamin, so that the dried pulses and cereals, though rich in the anti-neuritic element, are poor in anti-scorbutic vitamins.

Chick and Hume make the very important observation that *anti-scorbutic vitamin can be regenerated in these seeds by germination.*

This factor is more sensitive to heat than the anti-neuritic element, though it will stand cooking fairly well at a moderate temperature for one-half hour. It is evidently absent in tinned and sterilized food.

The conclusions drawn for the guidance of those who have to provide for the feeding of troops in such situations as that which occurred at Kut-el-Amara are that, as it is difficult to keep flour with the germ, biscuit should be issued which has been made of the whole grain and, secondly, that while every effort should be made to provide fresh fruit and vegetables these can be replaced by pulses, such as peas, which have been allowed to germinate and are then lightly cooked. Fruit juices if used as anti-scorbutics should be sterilized by filtration, not by heating.

THE SOLDIER AND TUBERCULOSIS.

The setback which the anti-tuberculosis campaign has experienced in England is elaborately dealt with in a recent number of *The Lancet* by Sir Arthur Newsholme, while the appalling ravages of the disease among the men called to the colors in France formed the subject of an article by Herman Biggs in *The Survey*.

Fortunately for our soldiers, all the authorities concerned are fully awake to the danger of enrolling recruits with discoverable tuberculosis. The danger is as great to themselves as for their comrades.

Dr. Knopf's article, published in this issue, is primarily addressed to the intelligent American soldier himself. Nevertheless, it contains, in so well arranged a form, information that most of us in these days want at our fingers' ends in order to impart it to the layman, that we welcome this opportunity of offering it the hospitality of our columns.

In next month's issue Dr. John B. Hawes 2d will, in a concise and practical manner, deal with the diagnosis of tuberculosis in recruits as the question presents itself in the conditions of mobilization.

COLLECTIVE ABSTRACTS.

ACUTE MERCURIC CHLORIDE POISONING—A REVIEW OF RECENT WORK.

BY THE EDITOR.

Those of us who have had long toxicological experience well remember the sudden and maintained popularity of carbolic acid as an instrument of suicide. Times have changed and of recent years phenol has lost favor, while acute poisoning by mercuric chloride has become alarmingly and increasingly frequent. In both cases the ease with which the drug can be obtained, and the reluctance of the authorities to hamper the sale of disinfectants, combined to favor their use as a means of self-destruction.

While serious poisoning with carbolic acid is rarely accidental, the contrary is the case with the bichloride. The compactness of the latter drug and its presentation in the form of compressed discs or tablets cause confusion with other drugs put up in a similar form, while its taste, though metallic and disagreeable, is not so strong, in the solid form, nor is the chloride so readily dissolved, as to warn the taker of his mistake in time to prevent the poison being swallowed.

Coloring the tablet goes a long way towards preventing such an accident, but it fails, when, as often happens, the bichloride is taken, in a poor light, in mistake for a "headache tablet." A remedy for this has been sought in two ways. The form of the tablet has been made distinctive, even coffin shaped, thus warning by touch and the difficulty of swallowing, and it has, secondly, been suggested that capsicum and mustard oil in minute quantity be added to the bichloride.¹

In addition to the accidents occurring from a mistake in the identity of the substance, a grave and in many cases fatal form of poisoning too frequently occurs from the ignorant use of bichloride for anticonceptive purposes, the drug, in the solid form, being placed in the vagina and left there to work its mischief.

One of the consequences of the increase in the number of fatal cases of bichloride poisoning has been the demand for preventive legislation.^{2,3} The suggestions in this direction that have been made, so far, look rather to the prevention of accidental poisoning and to the educational effect of putting a restriction on the sale than to making suicide difficult.

A more useful and immediately fruitful effort has been made by the pathologists and chemists. The pathology and chemistry of mercuric chloride poisoning have been carefully studied with a view to establishing a rational treatment.^{2,4,5,6} There seems no reason to doubt that this consummation has now been approximately attained. That this is not an overstatement is shown by the following figures for clinical results, figures which include very many grave cases, and some in which active treatment was begun late.

Schisler:¹⁸ 16 cases, 5 deaths; doses from 3 to 170 grains of bichloride.

Weiss:⁹ 28 cases, 1 death; doses from 3 to 82 grains of bichloride.

There are two striking symptoms in acute poisoning by corrosive sublimate

which fix the attention. These are the oliguria or anuria, which occurs in from 12 hours to three days after the taking of the poison, and the dysenteriform diarrhea.

The first is due to an acute nephritis and the second to the irritation and inflammation caused by the excretion of the mercury into the intestine.

The nephritis is but a local and manifest expression of a general condition which results in the kidney and elsewhere, notably in the liver, in cloudy swelling leading to fatty degeneration. The changes in the kidney have been shown to be roughly proportionate to the amount of the poison ingested, while the degree of liver damage is more affected by the time element.⁹

The fundamental biochemical condition underlying these pathological changes is a disturbance of the acid-base equilibrium, an acid intoxication. Mercury is present in the tissues, including the circulating fluids, and is continually excreted into the intestine; a condition of acid intoxication is set up resulting in cloudy swelling, and in the consequences thereof. The therapeutic problems are therefore, 1, to reduce the toxicity of the mercury in the system; 2, if possible to hasten its elimination; 3, to combat the acid intoxication and its attendant evils.

Chemical Antidotes.—The classical procedure for reducing the toxicity of the poison consisted in an attempt to fix it as an "albuminate," to this end white of egg and other albuminous fluids were administered.

As the albuminate is poisonous and soluble in excess of albumin, the giving of the antidote had to be alternated with the washing out of the stomach, if the vomiting produced by the poison were insufficient.

This method of treatment is admittedly very unsatisfactory. Two other chemical antidotes have recently been put forward, which both experimentally and clinically have given better promise. These are sodium phosphite and calcium sulphide. A third substance possibly should be classed here; this is magnesium oxide on the use of which in mercuric chloride poisoning Schisler has written an interesting report. The rationale of the use of the phosphite is that it reduces the mercuric to a mercurous salt with the formation of calomel. Apparently Linhart contemplates its use by intravenous injection in some cases. Sodium phosphite is not a substance likely to be at hand and calomel is very far from being an inert drug.

Wilms and Holms favor calcium sulphide as a chemical antidote. Holm mentions that he has been using this antidote in a large number of cases during three years. Some at least of his cases appear to have been mercurialism, occurring during the course of treatment. He does not particularly describe any grave cases treated by this method.

Wilms goes into much more detail. His paper is furnished with a bibliography, gives details of experiments on a number of animals, with controls, and also clinical reports of case in human beings. His paper is undoubtedly important. It leaves on one's mind the impression that calcium sulphide is the chemical antidote of election in cases of poisoning by mercuric chloride.

Wilms draws attention to the importance of fresh made solution, especially for intravenous use. He uses a strength of one grain to one ounce, giving one grain of the antidote for each grain of poison ingested. He considers the administration of albumin disadvantageous.

Holm, administering calcium sulphide by the mouth, gives from 1 to 5 grains and pushes the drug until the smell of hydrogen sulphide persists on the breath.

Magnesium oxide, advocated by Schisler, should probably be classed between the chemical antidotes and the next group. Magnesia has long been used in such cases as also in poisoning by most irritants, and by caustic

acids. It is one of the most popular constituents of the blunderbus antidotes.

It has probably a complex action, chemical by bringing the bichloride to a more insoluble form, mechanical in entangling the albuminate, and in protecting the mucous membrane. It promotes evacuation of the poison by the intestines, and it may have some slight efficacy in counteracting the acid intoxication. Notwithstanding the multiple actions of the magnesium oxide, Schisler's paper is not as convincing as some of the others. Partly this is due to the less favorable results he reports (in which respect it would be easy to be unjust) partly, to the fact that this method meets the pathological and chemical condition in a less clear cut manner than do the alternatives.

Elimination.—Emesis and gastric lavage are the first and most natural methods employed for the removal of the poison from the system. Vomiting usually, but by no means always, occurs spontaneously. Moreover, even in cases in which vomiting has taken place, it not infrequently ceases or falls short of what is needed. The ordinary emetics may be employed, to start or reinforce the emesis, but such as are not locally irritating should be chosen.

Washing out the stomach is, however, altogether preferable, and if the condition of the esophagus permits of it, there seems no sound reason for omitting this procedure.

Lambert and Patterson practice gastric lavage not only in the early stages but throughout the illness, giving three washings with warm water each day, and supplement this with proctoclysis. Brown and Baskett remark in this connection, "As our observations were begun for some months before Lambert and Patterson's work appeared, and as we had obtained satisfactory results without the gastric and colonic lavage recommended by them, we have felt justified in omitting it."

No attempt should be made to quicken the elimination of mercury by the administration of iodides. The result of such a course is to throw on the circulation the poison which has been partially or completely immobilized in the form of relatively insoluble compounds. It is to the facility with which soluble compounds of mercury with iodides are formed from insoluble ones that we often owe the accident of fulminating mercurialism occurring in the course of treatment by the intramuscular injection of calomel or other insoluble compound, when the physician is imprudent enough to administer an alkaline iodide (Holm).

Other measures, presently to be mentioned, which, in fact, assist in the elimination of the poison—such as diuresis and diaphoresis—do so incidentally, being intended as general eliminatives.

Treatment Directed to the Pathology.—Measures directed especially against the acid intoxication and its consequences are best developed and exemplified in the articles of Weiss, of Lambert and Patterson, and of Brown and Baskett.

The first of these is the fullest and the most instructive. Weiss reports 28 cases, with only one death, the doses being from 3 to 82 grains. It is notable that the fatal case was one in which the (solid) poison had been placed in the vagina. Of the 27 surviving cases, only one had a serious complication, viz.; extensive necrosis of the buccal mucous membrane, a condition probably reflected in the colon, for intestinal hemorrhages were also troublesome in the same case.

The keystone of the treatment is the administration of alkalies and hypertonic saline solutions by the mouth and rectum, and intravenously. The sign of improvement is the disappearance of anuria, and the criterion of

success is the rendering and maintaining of the urine reaction alkaline to methyl red (saturated solution of the indicator in alcohol). The first step is to empty the stomach. This is done by washing it out first with the whites of three eggs beaten up in one quart of milk, following this with plain water.

When the stomach has been emptied a solution of three ounces of magnesium sulphate in six ounces of water is placed and left in it.

The next step is the intravenous injection of an alkaline hypertonic saline solution. Weiss uses Fischer's solution. Others have favored other combinations and particularly those containing glucose. (e. g., Milian and Saint Avid, Lewis and Rivers). Fischer's solution contains sodium carbonate crystals 10 grams, sodium chloride 15 grams, made up to 1000 c.c. with water.

The Johns Hopkins reporters, recommending glucose, do so on two grounds; first, its protein sparing power; second, its "diuretic" action. It will be borne in mind that according to Fischer the role of the glucose solution in reducing edema (and thereby causing diuresis) is similar to that of the salts. There is in all this discussion a haunting sense of reluctance, perhaps not conscious, to give Fischer his due, of a striving after another explanatory formula to avoid using his.

For some reason, which escapes me, Weiss does not practice this intravenous injection at once, unless there has been no history of vomiting or unless the patient has not come under treatment within three hours of taking the poison. The treatment is innocuous and the limitation does not seem imperative. The amount injected varies from one to two liters. This is repeated, if the indications (urine) call for it, in 36 hours and occasionally afterwards. Of the following drink some eight glasses each day are given:

Cream of tartar (potassium bitartrate).....	4 grains
Sodium citrate	2 grains
Sugar	2 grains
Orange or lemon juice to taste; water, 8 ounces. The salts are added just before serving.	

In addition to this, a large quantity of water is forced upon the patient. The diet is liberal, avoiding an excess of nitrogenous food.

Lewis and Rivers in an elaborate chemical study of a case of bichloride poisoning, conclude that the nitrogen retention is an important factor in producing the intoxication. Hence their use of the glucose as a protein sparer. The same idea lies at the basis of the use of hot packs by Brown and Baskett and others. These authors give a hot pack twice a day, and a gastric and colon lavage twice a day until the urine is free from mercury.

Chemical Detection of Mercury.—Most toxicologists would be tempted to say that the means at our disposal for the analytical detection of mercury are rather too sensitive. I well remember an experienced analyst working at a microelectro-chemical method, and his despair at being unable to obtain a quite clean negative result in the atmosphere of an ordinary laboratory. It is only fair to say that such methods are intricate, and call for high analytical skill, such as is not always at the disposal of the clinician.

Attempts have been made with more or less success to overcome the difficulties of the procedure. The most successful of these seem to be the Vogel and Lee method, and Elliott's. The latter seeming to possess some advantages, is the one I shall select for description.

The fluid to be examined is acidified with hydrochloric acid and shaken vigorously with a pinch of copper dust. The fluid is decanted and the metal is washed, first with alcohol, then with ether, and finally is allowed to dry in the air. It is then placed in a small bulb ignition tube, and heated gently in a current of carbon dioxide, generated from magnesite placed in the same

tube. The volatilized mercury is caught, in the form of amalgam on gold leaf in a cool part of the tube, where it may be detected either by the naked eye or under a magnifying lens.

In the presence of a large quantity of protein matter the material is prepared by distillation with an equal volume of concentrated sulphuric acid, the distillate being condensed in a multiple bulb fractionating tube.

SUMMARY.

Practising a sane eclecticism, choosing the best elements among the methods of treatment suggested and rejecting incompatibles, I think it not too rash to offer the following as the best up-to-date routine for the treatment of cases of poisoning by bichloride of mercury.

First Stage.—1. Administer the white of three eggs beaten up in a quart of milk. If fresh calcium sulphide solution 1 grain to the ounce is at hand, use this.

2. Wash out the stomach by means of a stomach tube with water (or fresh calcium sulphide solution) until it is empty.

3. Place a solution of 3 ounces magnesium sulphate and 6 ounces of water with 5 grains of calcium sulphide freshly dissolved, in the stomach and leave it there.

4. Give, intravenously, one liter of Fischer's solution or of bicarbonate-glucose solution.

Second Stage.—5. Wash out the stomach and colon twice a day, giving by the mouth after each washing, 3 to 5 grains calcium sulphide dissolved in 3 to 5 ounces of water. Continue this lavage until the stomach washings are free from mercury (Elliott's test). Hot packs twice daily.

6. Administer daily 8 glasses of the bitartrate drink described, much water, and a liberal low-protein diet.

Continue the treatment, including intravenous injections, until the urine is persistently alkaline to methyl red.

Omit the calcium sulphide when there is no longer any mercury excreted in the urine.

Omit the more heroic part of the treatment (lavage and intravenous injections) as soon as the urine is persistently alkaline to methyl red.

Continue the bitartrate drink and the rest of the treatment expectantly until recovery.

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DEPARTMENT OF PATHOLOGICAL ANATOMY.

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Acute Lymphatic Leukemia and Lymphatic Leukosarcoma.

Among 5,600 autopsies performed at Bellevue Hospital in the past 11 years, there were 8 cases of lymphatic leukemia, and, of this number, 5 were of the chronic variety and 3 acute.

Chronic lymphatic leukemia is characterized by massive enlargement of the lymph nodes throughout the body, the lymphoid cells being poured into the blood in enormous numbers, by splenomegaly due to hyperplasia of the Malpighian follicles and diffuse lymphocytic infiltration of the pulp, and by lymphoid replacement of the bone marrow. The lymphoid structures of the gastro-intestinal tract rarely show changes worthy of note. The disease commences gradually and progresses slowly.

The acute cases, on the other hand, commence abruptly and pursue a rapid course, death occurring in a few weeks or 2 or 3 months at the latest. The lymph nodes and spleen are only slightly enlarged or not at all. Clinically, the disease is attended by fever, hemorrhagic extravasations into the skin, mucous and serous membranes, and rapidly developing anemia. Examination of the blood shows marked increase in the number of white cells, of which a great percentage is composed of large lymphocytes, and the bone marrow and spleen are more or less richly infiltrated.

Acute lymphatic leukemia is of great clinical interest, especially with reference to the possibility of an infective origin, and also as bearing upon a rare and apparently little known disease described by Sternberg¹ under the title of leukosarcoma, an example of which is presented below. The three cases of acute lymphatic leukemia encountered at autopsy at Bellevue Hospital are as follows:

CASE I.

The patient, a man aged 65, was admitted to Bellevue Hospital with the statement that, 4 weeks previously, he became subject to malaise, followed two weeks later by the appearance of a sudden buzzing sensation in the head associated with an attack of blindness lasting about 5 minutes. The next morning he noticed that the lips and chin were covered by clotted blood. Bleeding from the mouth continued and was present at the time of admission. Physical examination revealed no noteworthy changes other than marked pallor and a pulse of the trip-hammer type. Examination of the blood showed

195,200 white cells, of which 94 percent were large lymphocytes. There were no palpable lymph nodes. The temperature varied between 100° and 102.2° F.

Autopsy 4,419.—The body was that of a well developed, muscular man. There were no palpable lymph nodes. On section, the pericardium contained a slight excess of fluid and there were petechial hemorrhages in the parietal layer varying in size from 1 to 3 m.m. The aorta was atheromatous and, in the region of the bifurcation, were several polypoid thrombi. Altered blood was found in the stomach and intestines. The spleen was somewhat enlarged, flabby, and, on section, showed innumerable hemorrhages. The kidneys and bladder contained petechiae beneath the mucosa. The bone marrow was grayish in color and soft. The thoracic and abdominal lymph nodes were not enlarged.

Cultures from the spleen remained sterile.

Microscopic Examination.—The bone marrow was exceedingly cellular and consisted almost entirely of lymphocytic cells of the large variety. There were few granulated leukocytes and giant cells were rarely to be seen. The lymph nodes were composed practically exclusively of large lymphocytes. The spleen was diffusely infiltrated by large lymphocytes and there were innumerable hemorrhagic foci. In the liver were large numbers of lymphocytic foci lying in the perilobular connective tissues. The interstitial tissues of the kidneys, particularly in the cortex immediately under the capsule, were the seat of numbers of large and small, irregularly outlined foci made up of large lymphocytes. The blood vessels throughout the body enclosed innumerable lymphocytes of the same type.

CASE II.

The patient was a woman, aged 41, who was admitted to Bellevue Hospital with the statement that, 6 weeks previously, she suddenly became subject to bleeding from the gums and nose, and blood appeared in the urine. Two weeks later hemorrhages were observed in the subcutaneous tissues of the upper part of the chest, followed, a few days later, by similar extravasations in the tissues of the right lower limb. Finally, the patient commenced to vomit blood and the stools became tarry. The patient was now extremely pale, dyspnea was marked, headache was almost constant, she was occasionally irrational and death supervened. Examination of the blood showed 40,000 white cells, 2,200,000 red corpuscles and 10 percent Hb. The differential count of the white cells revealed a great preponderance of large lymphocytes. The temperature varied between 100° and 103.5° F.

Autopsy 4,599.—Beneath the skin of the left chest near the axilla was a large hemorrhagic extravasation. The skin covering the left tibia was likewise infiltrated, and the skin and conjunctivae were literally peppered with petechiae. The teeth were in poor condition and the gums were spongy and reddened. On section the muscle tissues of the anterior thorax were strewn with small hemorrhages. The pericardium was found to contain a large quantity of fluid blood. The aortic and mitral valves were the seat of vegetations capped by fibrinous exudate. The spleen weighed 334 gm. The follicles appeared to be large and the pulp was grayish red in color. The urinary bladder enclosed a quantity of blood-tinged urine. The lymph nodes throughout the body showed by enlargement. The marrow of the ribs and vertebrae was reddish in color, while that of the lower end of the femur was fatty without a trace of red. The posterior part of the right lobe of the cerebellum showed a large hemorrhagic extravasation and there were a few petechiae in the left cerebral hemisphere.

Cultures from the spleen remained sterile.

Anatomical Diagnosis.—Acute infective aortic and mitral valvulitis; hemorrhages into the conjunctivae, skin, bladder, pericardium, cerebellum and cerebrum, and the thoracic muscles; acute gingivitis; secondary anemia.

Microscopic Examination.—Smears and sections of the bone marrow showed vast numbers of large lymphocytes. The lymph nodes and spleen were infiltrated by cells of the same sort and the vessels throughout the body contained a considerable excess. In places the smaller vessels of the brain were choked by dense collections of large lymphocytes and the tissues in the immediate vicinity were hemorrhagic.

CASE III.

The patient, a woman, aged 74 years, was admitted to Bellevue Hospital with the classical signs of arterial sclerosis and senility. Other than for the presence of numerous petechiae in the skin there was nothing of interest clinically, except that the temperature was of the septic type, varying from 99° to 105° F. The superficial lymph nodes were not enlarged. No blood examination was made.

Autopsy 4,621.—The aortic valves showed several large, partly necrotic vegetations. The kidney was the seat of multiple abscesses. The retroperitoneal lymph nodes were enlarged and reddish. The spleen was enlarged reddish in color, and the follicles were numerous but small.

Cultures from the aortic valves and from the spleen showed a pure culture of *staphylococcus aureus*.

Microscopic examination of the lung, liver, spleen, kidney, and lymph nodes revealed numerous large and small foci of large lymphocytes.

Lymphatic Leukosarcoma.

The term leukosarcoma was introduced by Sternberg to indicate a disease characterized by the presence, in some part of the body, of a definite tumor composed of lymphoid cells which are eventually poured into the blood in such numbers as to constitute a true leukemia. Two varieties of leukosarcoma are recognized, one in which the original growth is made up of cells of the lymphocytic type, the subsequent infiltration of the blood representing a variety of lymphatic leukemia, and a second, in which the original focus is composed of myelocytes, the discharge of which into the blood gives rise to leukemia of the myelogenous type. In his last paper on the subject Sternberg records 8 cases, 6 of which were of the lymphatic type and 2 of the myelogenous. In 4 cases of the lymphatic variety the original growth was located in the anterior mediastinum, corresponding to the lymphoid remnants of the thymus gland. In three of these cases the clinical facts indicated that the thoracic growths had been present, respectively, for 4 months, 5 months, and 3 years. In the fourth case the clinical disturbances were said to have been of 3 weeks' duration, but the intrathoracic tumor was of enormous size, and according to Sternberg, must have been in existence for a period greatly in excess of that suggested by the clinical history. In the remaining two cases of lymphatic leukosarcoma, one was a primary tumor of the orbital region of 3 months, and the other a tumor of the neck of 7 weeks' duration. Cases of mediastinal lymphatic leuko-

sarcoma have also been recorded by Weber,² Mager,³ O'Kelly,⁴ Cole,⁵ and others.

Certain observers, notably Naegeli, have denied the existence of leukosarcoma as a disease independent of lymphatic leukemia, in which, they maintain, secondary tumor-like nodules may arise in various localities. Paltauf, Buschke, and Hirschfeld, however, have recorded examples of leukosarcoma in which lymphoid tumors were in evidence before the appearance of leukemic changes in the blood. A case of this sort recently occurred in the autopsy service at Bellevue Hospital, and is here presented in some detail as further confirmation of the occurrence of leukosarcoma as a clinical and pathological entity.

The recognition of lymphatic leukosarcoma depends upon three factors, first, the existence of a tumor which, upon microscopic examination reveals the histological picture of a lymphosarcoma, the cells, contrary to the usual arrangement, consisting almost exclusively of large lymphocytes with an admixture of small cells. In occasional instances, however, this order is reversed. In the greater number of cases thus far reported, the large lymphocyte was described as the preponderating cell, both in the primary focus of growth and in the blood. In Cole's case, on the other hand, the cells in both places were of the type of small lymphocytes. Second, the original focus of growth may exist for weeks, months or years before invasion of the blood stream occurs, but involvement of the blood, when it does take place, is abrupt and the disease then progresses with extreme rapidity. Third, the disease is accompanied by enlargement of the spleen, the lymph nodes in various situations, the liver, kidney, etc., due to diffuse infiltration of lymphocytic cells to or their presence in circumscribed collections. In short, the disease, as its name implies, is a variety of lymphosarcoma with leukemic transformation.

The case of leukosarcoma observed in Bellevue Hospital was that of a woman, aged 25, who presented a tumor on the neck that was of 3 years' duration. The mass was irregularly rounded and nodular, and extended from the occiput downward over the posterior cervical region. The skin over it was ulcerated and covered by scaly material. In the immediate vicinity of the growth, corresponding to the submaxillary and cervical regions, were numbers of enlarged nodes which were matted together. The axillary nodes on the same side were greatly enlarged and fused, a condition which, according to the patient, came on two years after the appearance of the growth in the neck. The inguinal nodes on both sides were similarly involved, commencing, the patient stated, 2 months after the axillary enlargement. The tonsils were large.

One month before admission, the patient said, her skin began to scale. At the time of admission she presented the picture of a diffuse exfoliating dermatitis. The spleen was palpable several fingers' breadth below the costal slope. The liver was felt at the level of the umbilicus. At the time of admission the blood showed 15,800 leukocytes, of which 70 percent were polynuclear

neutrophiles, 22 percent small lymphocytes, and 2 percent large lymphocytes. A month later, that is to say, about 3 weeks before death, the white cells numbered 164,000, of which 28 percent were polynuclear neutrophiles, 52 percent large mononuclear cells of the lymphocytic type, 14 percent small lymphocytes, 5 percent eosinophiles and 1 percent myelocytes. The red cells were 4,000,000 and the Hb. 65 percent.

Autopsy 4,202.—The body was that of a greatly emaciated woman. The skin was scaly, dry and wrinkled. On the lower part of the right side of the neck was a large, fungating mass. Around it the subcutaneous tissues were edematous and, in the immediate vicinity of the growth were enlarged lymph nodes which, on section, presented a pale, glistening surface. Some of them were necrotic. Both tonsils were enlarged and infiltrated by tumor tissue and the axillary nodes were similarly changed. The abdomen contained a quantity of turbid, slightly greenish fluid. The anterior mediastinal and peribronchial lymph nodes were enlarged and infiltrated. There was a considerable quantity of fluid in the pericardium. The spleen was enlarged, reaching a hand's breadth below the costal slope on the left side. It measured 22x13x9 c.m. The liver weighed 2,120 grm., and scattered through it were numbers of small, whitish spots. The perigastric, peripancreatic, retroperitoneal, mesenteric, and inguinal nodes were enlarged and exceedingly numerous. Most of them were discrete and encapsulated. Some of them were centrally necrotic.

Microscopic Examination.—Microscopic examination of lymph nodes removed from the immediate vicinity of the growth in the neck showed the presence of large numbers of small lymphocytes and somewhat smaller numbers of lymphocytes of the large variety. There were a few eosinophiles scattered here and there. The architecture of the node was completely replaced by diffuse overgrowth of cells and the capsule was moderately richly infiltrated. Mitotic figures were numerous. In lymph nodes removed from other parts of the body the preponderating cell was of the large type, relatively few small ones being observed. The spleen was diffusely infiltrated by large, mononuclear cells, and the peribulbar connective tissues of the liver supported numerous large foci of identical composition. The bone marrow was almost completely replaced by infiltrating cells of the same type, and the blood vessels throughout the body contained them in great numbers.

Anthrax.

Among animals, geographically as well as zoologically, anthrax is the most widespread of all acute infective diseases. In occasional instances it is transmitted to man, usually through abrasions of the skin that have been in contact with infected hides, furs, and the like, but sometimes by swallowing or breathing. In recent years the occurrence of anthrax in human beings has undergone a notable increase, and it is now regarded by students of industrial conditions as an occupational disease of moment. Moreover, in view of the fact that hides, furs, and other products of anthrax-infested districts are seldom, if ever, subjected to disinfection before shipping, it is to be expected that anthrax will undergo still further increase as our trade with the cattle countries enlarges. In this climate anthrax is most often encountered among handlers of hides imported from the Argentine and the

Far East. Sometimes the disease occurs in sporadic form, sometimes as an epidemic among longshoremen engaged in unloading the same cargo. In New York City, I am told, the physicians in the several hospitals along the Brooklyn water front are always on the alert for cases of anthrax developing in the handlers of hides from the Argentine.

The prognosis of anthrax depends upon several factors, and the mortality varies within rather wide limits. For example, the malignant anthrax edema of the face and neck is invariably fatal, largely because of infiltration of the soft tissues around the larynx, pharynx, and esophagus. In the same way the wool-sorter's disease, which is an anthrax septicemia with intense pulmonary and cerebral symptoms, and anthrax of the intestinal tract, are likewise deadly. The malignant pustule, on the other hand, not infrequently heals and the patient recovers. In the case of malignant pustule of the face, however, the mortality is five times greater than that of an extremity, in which only about 5 percent of cases terminate fatally.

In general hospital work anthrax is commonly regarded as a rare disease. In the past two years at Bellevue Hospital, however, there have been 7 cases, two of which were investigated post mortem. Both were attended by characteristic pustules in the skin, and in one of the subjects secondary intestinal lesions were found, due to occlusion of the vessels of the serosa by anthrax bacilli, and the formation of hemorrhagic and necrotic infarctions.

Anthrax occurs in three forms—cutaneous, pulmonary, and intestinal. The cutaneous anthrax, or malignant pustule, is a characteristic and often easily recognized lesion which is seen most often on the face, neck, hands, or arms. At the site and within a few hours of inoculation a small papule appears. It is soon surrounded by brawny edema, and rapidly undergoes central necrosis, attended by the formation of a series of silvery vesicles immediately circumferential to the necrotic zone. The area of edema spreads and may involve a wide sweep of skin. Although the temperature rises rapidly the patient rarely becomes delirious, on the contrary, the mentality is apt to remain clear throughout and apprehension is seldom shown.

CASE I.

The patient, a man, aged 52, a handler of hides, was admitted to Bellevue Hospital with the statement that, on the previous evening, he experienced an itching sensation on the right side of the chest. The itching continued throughout the night, and the next morning he noticed a small pimple surrounded by an area of redness the size of a quarter dollar. At the time of admission the pimple was centrally necrotic and covered by a crust, and the surrounding area of redness was 4 inches in diameter. There was edema of the right side of the body as far as the groin, and the penis and scrotum were enormously swollen. Death occurred 3 days after admission.

Autopsy 4,711.—Two inches below and to the outer side of the right nipple was a reddish nodule 6 m.m. in diameter, that was centrally necrotic and covered by a dry scab. For a distance of 8 or 10 c.m. the skin was brawny and reddish in color. This gradually faded into the surrounding tissues, which were the seat of non-pitting edema that extended down the right side of the body and involved the penis and scrotum. The latter was enlarged to the size of a grape fruit. The lungs were unchanged except for the presence beneath the pleura on the right side of a solitary hemorrhagic focus. The other organs showed no lesions worthy of mention at this time.

Smears made from the pustule during life showed typical anthrax bacilli. A blood culture from the patient taken two hours before death revealed colonies of anthrax bacilli presenting the typical Medusa-like appearance, and numerous colonies were grown on plates inoculated from the spleen and liver.

CASE II.

The patient was a young Jewish girl who was admitted to Bellevue Hospital in collapse. It was learned that she had recently purchased and worn a cheap fur neckpiece, but it was not possible to secure the fur for bacteriological examination. On the right side of the chest just below the neck was a hemorrhagic, centrally necrotic pustule, the skin around which was markedly edematous. The necrotic area was covered by a grayish-red scab, in the vicinity of which, corresponding to the edge of the ulcerated area, were numbers of small, grayish vesicles. Smears made from the pustule revealed numerous large, encapsulated, Gram-positive bacilli.

Autopsy 4,742.—The body was that of a well nourished female, 17 years of age. In the skin of the chest on the right side of the sternum at about the level of the third rib was a hemorrhagic, centrally necrotic pustule about 1 c.m. in diameter, the skin around which was the seat of extensive, firm edema. The lungs were pale, but scattered through them, particularly in the dependent parts, were numerous hemorrhagic foci. Lying in the small intestine opposite the mesenteric attachment were several dark reddish, hemorrhagic nodules measuring from 1 to 5 c.m. in diameter. The peritoneal surface corresponding to the location of these nodules was roughened, swollen and hemorrhagic, and in the peritoneum around the nodules were numbers of small veins distended by red thrombi. On the mucous surface the nodules were elevated to the extent of several millimeters. The periphery of the nodules was marked by a swollen, edematous, hemorrhagic zone and the center was the seat of a grayish excavation. The lymph nodes in the adjoining mesentery were enlarged and congested. The peritoneum was bathed in a quantity of blood-tinged fluid.

Numerous anthrax bacilli were found in plates inoculated from the liver and spleen. A guinea pig injected intraperitoneally with material from the pustule showed extensive subcutaneous edema along the track of the needle, and anthrax bacilli were recovered from the blood, spleen, and bile.

There are several points in the pathology of the anthrax pustule that are of practical value in determining the method of treatment. At the outset the malignant pustule is essentially a localized lesion, and the causative micro-organisms are confined within a limited zone, at least for a time, invasion of the blood occurring as a late event. If taken sufficiently early, therefore, excision of the pustule offers the best chance of recovery. At the same time, it is unwise to incise the edematous tissues in the immediate vicinity of the pustule, for the reason that the gelatinoid infiltration or the

so-called anthraco-mucin of the lymph spaces is of the nature of a protective mechanism. In the edematous area the anthrax bacillus is rarely to be found. Incision, therefore, not only does not drain the affected region of inimical bacteria, but is actually harmful, opening the way to secondary infection and breaking down a barrier to the spread of existing infection.

The serum treatment of anthrax has received a great deal of attention in recent years. The specific anti-anthrax serum of Selvao is said to have reduced the mortality to a marked extent. More recently still, the government authorities in the Argentine have been using normal bovine serum intravenously in large doses, and it is said that the results are even more favorable than from the use of specific antiserum. In our cases at Bellevue Hospital we have employed the anti-anthrax serum supplied by the United States Government. Although the serum treatment is by no means to be discouraged, it is none the less urgent that early excision of the anthrax pustule be practiced, serum or no serum.

Acute Syphilitic Glomerulonephritis.

In early secondary syphilis the appearance of moderate quantities of albumin and casts in the urine is not infrequent. It represents a response to irritation, and is attended, histologically, by degenerative changes in the epithelium of the convoluted tubules and by the presence of small quantities of coagulated serous exudate in the glomeruli. It is a transient process and complete recovery occurs when the irritant is withdrawn. Formerly, the urinary changes in question were ascribed to the influence of treatment by mercury, but this view has since been abandoned.

On the other hand, syphilis is sometimes the cause of acute inflammatory changes in the kidney of such nature and extent as permanently to disable the kidney or even to cause death. The condition is casually mentioned in text-books in clinical medicine and pathology, but, in bed-side work and in the experience of the autopsy room, acute syphilitic nephritis is exceedingly rare. In a case recently investigated post mortem at Bellevue Hospital death occurred after a brief illness and the changes in the kidney were of the same type as those encountered in the acute nephritis of scarlet fever.

The patient was a man, aged 26 years, a waiter by occupation, who was admitted to the Bellevue Hospital with the statement that, three weeks previously, an eruption appeared on the arms, chest and back. A week later the patient noticed that his legs were swollen, particularly in the evening, and he began to suffer from continuous headache. He also observed that the urine was beginning to diminish in amount. At the time of admission physical examination revealed a symmetrically distributed macular eruption attended

by enlargement of the axillary, epitrochlear, and inguinal lymph nodes. There was a puckered scar on the left side of the penis. The ankles were slightly edematous. In the course of the next 13 days the edema of the ankles increased and the face became similarly involved, the eyelids to such an extent as to cause almost complete closure of the palpebral fissure. The patient was now extremely pallid, at times drowsy, at other times irritable and restless. There were occasional intervals of diarrhea. Toward the end of his stay in the hospital a friction rub appeared just to the left of the sternum, and was synchronous with the heart beat. The temperature was normal throughout. The urine was diminished in quantity, averaging less than 400 c.c. daily. The specific gravity was 1,012, albumin was present in abundance, and there were innumerable hyaline and granular casts. The nitrogenous constituents of the blood were distributed thus:

	Mg. per 100 c.c.	Normal Mg. per 100 c.c.
Creatinine.	4.4	.1— .5
Non-protein N.	83.00	30 —45
Uric acid.	3.5	1 —3
Urea N.	61.00	15 —25

The Wassermann reaction was strongly positive. The blood pressure was 175/120. Mercury was not administered. Death occurred on the 14th day after admission.

Autopsy 5,600.—The body was that of a man, aged 26, of well developed frame, excellent musculature and nutrition. The muco-cutaneous junction of the upper lip at about its center presented a small, grayish, superficially macerated patch. There was a similar excoriation on the mucous membrane of the cheek just behind the angle of the mouth on the right side. The skin was the seat of a generalized and symmetrically distributed eruption of rounded, plaque-like elevations from 2 to 7 m.m. in diameter. They were whitish in appearance, distinctly indurated, and fixed as far as the skin was concerned, but freely movable against the subcutaneous tissues. The skin covering them was finely wrinkled, in places desquamating. The penis presented, on the left side, a puckered scar which was indurated and around which the prepuce was edematous. The posterior cervical, axillary, and inguinal nodes were easily palpable. They were firm in consistence, discrete, freely movable, and varied in size from a few millimeters to a centimeter. The scrotum was edematous. The tibiae were smooth and there was no pre-tibial edema.

Pericardium.—Both layers of the pericardium were covered by a thin sheeting of fine, shaggy, fibrinous exudate, between which was a considerable excess of thin, cream colored, cloudy fluid. Heart: The heart approximated the normal in size. The left ventricle, however, was thickened, measuring nearly 2 c.m. at the attachment of the posterior mitral leaflet. The muscle substance was firm, compact, swollen, opaque and pink in color. In the aorta, just above the posterior sinus of Valsalva, was a faintly cream colored, hyaline elevation, about 1 c.m. in diameter. It was free from calcification. Scattered throughout the aorta were innumerable pin-head sized, bright yellow patches which, in the lower reaches of the vessels, were thickly distributed around the ostia of the outgoing arteries. Lungs: The lungs presented no noteworthy changes other than congestion and velvety swelling of the mucosa of the bronchi. Spleen: The spleen weighed 200 grm. It measured 12x6x3 c.m. On section the substance was compact, the follicles were scarcely visible, but the pulp was distinctly grayish in tint. Kidneys: The kidneys were markedly increased in size, measuring 14x6x5 c.m. On section the organ cut readily. The capsule

stripped with ease, leaving a smooth, grayish red surface, which was finely mottled, reddish points and streaks alternating with cream colored areas. The substance of the organ was greatly swollen, opaque, easily torn and, on pressure, exuded large quantities of thin, slightly blood-tinged serum. The cut surface was finely mottled. The cortical markings were irregular but distinct, the Malpighian bodies standing out as sand-like, glistening elevations. Lymph nodes: The retro-peritoneal nodes, particularly in the region of the promontory of the sacrum, together with those in the mesentery, were enlarged, varying in size from a few millimeters to 2 or 3 c.m. They were firm in consistency, pearly white in color, and were embedded in edematous fat or connective tissue. The inguinal nodes presented the same appearance, but were even larger than those described.

The base of the tongue showed moderate numbers of hyperplastic lymphoid follicles, the faucial tonsils were enlarged, the thyroid was distinctly increased in size, and, on section, the cut surface was finely granular due to the presence of innumerable small, brownish, colloid-containing vesicles. The mucosa of the larynx and of the trachea was edematous and hyperemic.

Anatomical Diagnosis.—Secondary syphilis: Symmetrically distributed, indurated maculo-papular eruption of the skin, hyperplasia of the postcervical, axillary, inguinal, retroperitoneal, and mesenteric lymph nodes; indurated scar of penis, edema of prepuce; mucous patches on the lip and cheek; acute sero-fibrinous pericarditis; acute parenchymatous degeneration of heart, hypertrophy of left ventricle, acute fatty degeneration of aorta; acute bronchitis; diffuse hyperplasia of splenic pulp; acute diffuse nephritis with marked glomerular changes; hyperplasia of the lingual and faucial tonsils; parenchymatous goitre; edema of larynx and trachea.

Microscopic Examination.—Skin nodules. The epithelial papillae were atrophied, the subcutaneous tissues enormously thickened and hyalinized. There were numbers of distended capillary vessels, some of which showed hyperplasia of the lining endothelium, and around the vessels were dense collections of small, round and plasma cells. Lymph nodes: The capsule was thickened and edematous and the fibrous prolongations into the substance of the nodes were fairly numerous and broad. The endothelium of the sinuses was hyperplastic and desquamating. The lymphoid cells, including those of the germinal follicles, were enormously increased in volume. Spleen: The spleen showed innumerable small but richly cellular lymphoid follicles together with minute clumps scattered through the pulp and a moderately profuse sprinkling of lymphoid cells. The sinuses were distended by blood. Kidney: The blood vessels, particularly in the cortex, were distended. The interstitial tissues were diffusely edematous. The lining epithelium of the convoluted tubules was swollen, granular, and frequently exfoliated in the form of casts. Here and there the tubules were distended by casts made up of degenerate epithelium, small, round cells, a few polynuclear neutrophils and nuclear dust. The tufts were enormously increased in size. Some of them consisted almost entirely of polynuclear leukocytes in various stages of disintegration. Others were composed of a central collection of degenerate polynuclear leukocytes, around which the glomerular capillaries were still visible but compressed, while at the periphery where crescentic or circumferential collections of small polyhedral or flattened cells surrounded by a layer of delicate spindle shaped elements. Lying at the extreme border of the glomerular tufts were to be made out occasional tubular formations lined by rather low, ill defined cells of the epithelial type, representing, apparently, an attempt at regeneration.

Sections of the various organs were stained by the older method of Levaditi for spirochetæ, but none was found.

Akromegalic Giantism.

Hyperactivity of the anterior lobe of the pituitary coming on before the completion of epiphyseal ossification results in giantism, that is to say, the individual is over-grown but well proportioned. After epiphyseal ossification is complete, however, hyperactivity of the hypophysis results in akromegaly with or without giantism. That the relationship between akromegaly and giantism is close is shown by the fact that a considerable percentage of akromegalics are giants and that a still larger percentage of giants develop akromegaly.

The pathological changes in akromegalic giantism may be grouped as follows:

(a) Changes in the bones and cartilages. (b) Enormous increase in the size of certain viscera, notably the heart, lungs, liver and spleen (splanchnomegaly). (c) Atrophy of the genitals. (d) Disease of the pituitary, such as adenomatoid hyperplasia, replacement by syphilitic or tuberculosis granulomata, cysts, hemorrhage, etc. (e) Finally, akromegaly is not uncommonly attended by changes in the ductless glands other than the pituitary. Thus, status lymphaticus is sometimes recognizable in akromegalic subjects—persistence of the thymus, hyperplasia of the lymphoid follicles in the nodes, gastro-intestinal tract and spleen, together with changes in the bodily configuration characterized, in the male, by reversion to the female type of stature. The facial and axillary hairs are scanty and the pubic hairs are sharply cut in transverse direction. The skin is unusually delicate. The waist line is narrow and the thighs arching (Charles Norris). In the female, the changes in stature represent but an accentuation of conditions which normally obtain—the axillary hairs are scanty and the fat pads small, the skin is exceedingly fine, the waist unusually narrow and the thighs more noticeably arched than in normal circumstances. In addition, the cardio-vascular apparatus is hypoplastic, that is to say, the heart is small and the aorta diminished in calibre.

Changes in the thyroid are commonly found in akromegaly, and consist in interstitial fibrosis, adenomatoid hyperplasia, and the like. In fact, the frequency with which the thyroid is altered, taken in conjunction with the enlargement of the hypophysis in myxedema and after experimental thyroidectomy, had led certain observers to the conclusion that interference with the normal interaction of these glands is a formidable factor in the production of akromegaly.

Glycosuria is a symptom of frequent occurrence in akromegaly. Sometimes it is a sign of genuine diabetes due to sclerotic and hyaline changes in the islands of Langerhans in the pancreas. At other times it is but an expression of diminished tolerance for

carbohydrates brought about by increased activity of the hypophysis. In still other cases of akromegaly the patient develops signs of hypophyseal insufficiency marked by increased tolerance of carbohydrates, impotence, obesity, etc.

Akromegaly usually begins in the third or fourth decade. It is rather more frequent among men than women. Heredity appears to play a role. For example, it has been observed in both parents and a child, in father and son, in father and daughter, in mother and daughter, and, in the case outlined below, in two brothers.

A case of akromegalic giantism coming under my observation occurred in the person of a 40-year-old Lombard who had come to this country to substitute for his brother—an akromegalic giant—in the Barnum and Bailey Circus. The patient was admitted to the Willard Parker Hospital with the diagnosis of diphtheria, and died 24 hours later.

Autopsy.—The body was that of a man, 8 feet 10 inches in height. The head approached a square in outline and measured 2 feet 6 inches in circumference at the level of the occipital protuberance. The forehead was 4 inches from above downward and 8 inches in a transverse direction. The supraorbital ridges were extremely prominent, the malar bones stood out boldly and there was marked prognathism. The nose measured $3\frac{1}{2}$ inches from bridge to tip. The hands and feet were enormously enlarged, the former being spade-like in appearance.

The face was largely bereft of hair. The axillary hairs were scanty and the fat pads deficient. The pubic hairs were poorly developed and sharply cut in a transverse direction. The skin was delicate in texture, the waist line narrowed and the thighs arching. The penis was relatively small in diameter and short, the glans diminished in size and acorn-shaped.

Head.—The cranial bosses were prominent. The diploe of the skull were large and the frontal sinuses enormous, reaching high up the forehead. The mastoid cells were large as were the sphenoidal sinuses, and the sella turcica was greatly deepened. On removing the brain, it was found that the optic nerves were flattened and the interval between them broadened, the left nerve being pushed to the outer side. Projecting from the sella turcica was a whitish or cream colored, smooth, rather soft growth which measured $2\text{lx} \times 9$ inches and weighed 5.94 grm. The mass projected outward, backward and to the left, displacing the optic nerves and flattening them. On the under surface of the brain the growth had hollowed out a place for itself between the quadrigeminal bodies behind and the optic chiasm in front.

Thorax.—The cartilages of the ribs were enlarged, averaging nearly an inch in thickness. They were smooth, free from calcification, and projected anteriorly. The thymus was present and was flesh-like in appearance. The heart was large and flabby, the aorta noticeably small. The lungs were enormous. The spleen weighed 890 grm. and measured $12 \times 5 \times 2$ inches. The adrenals were flat and the cortices greatly narrowed. The kidneys measured $7 \times 3 \times 2$ inches. The intestinal lymphoid follicles were numerous. The liver measured $18 \times 10 \times 4$ inches and weighed 13 pounds. The prostate and testicles were small. The thyroid was greatly enlarged, each lateral lobe measuring 4 inches in length. On section the cut surface presented a dirty brownish appearance and there were numerous large, cystic alveoli filled by gelatinous material representing altered colloid.

Microscopic examination of the pituitary revealed a richly cellular adenoma.

Anatomical Diagnosis.—Akromegalic giantism. Hypertrophy of the cranial bosses, the supra-orbital ridges, malar bones, inferior maxilla, nasal

bones and the bones of the hands and feet; marked osteoporosis of the cranial bones. Adenoma of the pituitary gland. Pressure atrophy of the optic nerves and of the under surface of the brain between the corpora quadrigemina and the optic chiasm. Hypertrophy of the cartilages of the ribs. Splanch-nomegaly. Atrophy of the genitals. Status lymphaticus (bodily conformation of the female type, persistent thymus, hyperplasia of the intestinal lymphoid follicles, hypoplasia of the aorta and of the cortices of the adrenals). Cystic adenoma of the thyroid gland.*

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ORIGINAL ARTICLES.

STUDIES IN THE CHEMISTRY OF THE BLOOD, WITH
CLINICAL DATA IN 173 HOSPITAL CASES.*

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A vast amount of work on the chemistry of the blood, with special regard to the non-protein nitrogenous constituents, in health and pathological conditions,¹ especially nephritis, has appeared in the literature in the last few years. Most investigators have studied only selected cases, and their conclusions were dependent on the special conditions studied, and in many cases the exceptions were entirely disregarded. Our object in presenting this paper is to compare the actual laboratory findings with clinical manifestations in a large number of cases, such as one finds in an active medical service, carefully studied as they come, and then classified according to the findings.

Normal Blood Figures.—Almost all the figures for the non-protein nitrogenous constituents of the blood of healthy individuals that have appeared in the literature are the result of work done on hospital patients, and can only be considered as normal in so far that they are free from renal involvement. The standard figures based on these normal cases on a purin free diet, the blood being taken before breakfast and about twelve hours after the last meal, are as follows:

Total non-protein nitrogen.....	25	to	35	mg. per 100 c.c
Urea nitrogen	12	to	18	mg. per 100 c.c
Uric acid	0.8	to	2.5	mg. per 100 c.c
Creatinine	0.8	to	2	mg. per 100 c.c
Sugar as glucose.....	0.08	to	.15	percent

In a comparative study of many tests for renal function, Mosen-thal and Lewis¹⁶ give 30 mg. per 100 c.c. of blood for the total non-protein nitrogen, and 15 m. per 100 c.c. of blood for the urea nitrogen as the upper limits for the blood of normal individuals. Any values above these mentioned may be regarded as indicating some degree of renal insufficiency; when figures as high as 80 mg. of non-protein nitrogen per 100 c.c. of blood are obtained a great

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increase is indicated, and it is a definite sign of retention of these waste nitrogenous products.

The total non-protein nitrogen is made up of its constituents, urea, uric acid, creatinine, etc. The urea nitrogen in normal individuals constitutes 50 percent of the total non-protein nitrogen, and when retention has occurred this percentage increases. All the components of the total non-protein nitrogen are also increased with retention. Myers, Fine, and Lough¹⁷ have shown that as the permeability of the kidney is lowered, retention of the non-protein nitrogenous constituents takes place as follows: first, uric acid; second, urea; last, creatinine. In gout and lead poisoning, there is a marked increase of uric acid in the blood, without any increase of the other non-protein nitrogen constituents.

The phenolsulphonephthalein test has been widely used in estimating the functional activity of the kidneys. The normal individual eliminates from 60 to 80 percent of the drug within two hours. It is generally acknowledged that, with retention of waste nitrogenous products in the blood, there is a diminution in the output of the drug.

Functional condition of the kidney, therefore, may be determined by the retention of nitrogenous substances in the blood and by their excretion by the kidneys. By a comparison of both methods we may arrive at a more accurate condition of the activity of the kidneys.

TECHNIC EMPLOYED.

Urine Analysis.—Total nitrogen was done by the Kjeldahl method; urea, by a modification of Van Slyke and Cullens' urease method;¹⁵ phenolsulphonephthalein was injected intramuscularly according to the method of Rowntree and Geraghty;¹⁸ the extent of secretion of the drug in two hours was estimated with the Hellige colorimeter.

Blood Analysis.—The methods employed in the chemical analysis of the blood have been described by one of us.¹⁹ Both the Hellige and Dubosc colorimeters were employed. The McClean index²⁰ was obtained by using the same methods for urea in the blood, and also in the urine as described above, and the index itself calculated according to McClean's formula. The degree of acidosis was ascertained from the carbon dioxide combining power of the blood plasma according to the method of Van Slyke.²¹

DISCUSSION.

Prostate Cases.—Table I gives the results of the examination of the blood of 10 pathological prostate cases taken immediately before operation. In no case was there a marked retention. In all but one case, the uric acid was increased. The average amount of uric acid in the 10 cases was 3.7 mg. per 100 c.c. of blood. The

phenolsulphonephthalein output was low in 2 of the 7 cases examined. There was no acidosis present in the 4 cases examined. Four patients succumbed to the operation but none showed any uremic symptoms.

Cancer.—Of the 7 cases of cancer in our series (Table II), only one showed evidences of retention; this patient also had a low phenolsulphonephthalein output, and was evidently suffering from a moderately severe nephritis. Two other cases showed an increase of uric acid.

Asthma.—Except for a high uric acid and creatinine and diminished phenolsulphonephthalein output in one case which was a renal asthma (Table III), there were no abnormal blood findings in the 6 cases of asthma.

Gout and Arthritis.—Two typical cases of gout (Table IV), showed a high concentration of uric acid, without any increase of the other non-protein nitrogen constituents. The urines in both cases were negative and there were no evidences of renal insufficiency. The other 11 cases in the table (arthritis) with the exception of one case, showed a normal uric acid concentration. The other case, No. 5398, showed a uric acid concentration of 4.4 mg. per 100 c.c. of blood; this case had a complicating nephritis with a slight nitrogen retention, and this increased uric acid may be accounted for by the nephritis.

Diabetes Mellitus.—Eight cases of diabetes (Table V), showed a hyperglycemia. Two cases had acidosis, the CO_2 combining power of the blood plasma being in one case 48 and in the other 28 volumes percent. All but three showed acetonuria. Under the Allen treatment, six improved; of the other two cases, one had an accompanying nephritis with marked retention but without uremic symptoms, and died in coma; the other case (3810) with a severe acidosis also died.

Organic Heart Disease.—The non-protein nitrogen, urea and creatinine in 13 cases of organic heart disease were within normal limits (Table VI). The average figure for the uric acid concentration was 2.4 mg. per 100 c.c. of blood. However, 4 cases showed an increased uric acid concentration. The phenolsulphonephthalein output in two hours varied from 18 to 80 percent.

Miscellaneous Cases.—With the exception of a high uric acid in 4 cases, one of which being an acute lead poisoning case, the 32 miscellaneous cases in Table VII showed no unusual blood changes. The phenolsulphonephthalein output varied from 28 to 89 percent.

Organic Heart Disease With Nephritis.—Thirteen out of 14 cases of organic heart disease with nephritis (Table VIII), showed albumin and casts in the urine. In these cases the total nitrogen elimination as compared to the urea nitrogen was normal. The blood analysis showed marked retention in only one case, and this

patient died. In 5 cases there was an increased uric acid concentration. In two cases the CO_2 combining power of the blood plasma was considerably decreased. The phenolsulphonephthalein output varied from 0 to 75 percent.

Acute Nephritis.—In 6 cases of acute nephritis (Table IX) very little information could be obtained from a study of the nitrogen elimination. An example of such a case (1300) will illustrate this point. The urea nitrogen is 80 percent of the total nitrogen; this is the normal figure for individuals free from renal disease. The blood analysis in this case shows a retention of waste nitrogenous products. At the onset of the disease 4 cases showed a retention of all the nitrogenous constituents; the other two cases (2502 and 5975) showed a retention of uric acid. Case 2674 had a marked retention of all the waste nitrogenous products except uric acid. The spinal fluid also showed a marked increase in concentration of the non-protein nitrogenous constituents, and only a trace of uric acid. Leopold and Bernhard²² have shown that when retention in the blood has occurred, the non-protein nitrogenous constituents of the spinal fluid are also increased. Case 7782, acute mercury poisoning²³ with recovery, showed at the onset a marked retention of non-protein nitrogenous constituents. As the condition improved the blood came back to normal. The phenolsulphonephthalein output paralleled the blood figures; when retention was marked the excretion was lowered, and as the condition improved the phenolsulphonephthalein output was increased.

Mild Chronic Nephritis.—In this grouping are included patients with long standing albuminuria and casts, suffering from very mild general disturbances, i. e., nephritics of the ambulatory type. Table X shows 26 cases of mild chronic nephritis with edema. Only 3 cases showed a retention of non-protein nitrogenous constituents. Sixteen cases showed an increased uric acid concentration; two cases had a diminished CO_2 combining power. The blood pressure was increased in every case. One case showed a slightly diminished McLean ratio. In most of the patients the phenolsulphonephthalein output was diminished.

In nine cases of chronic nephritis without edema (Table XI), two cases showed an increased uric acid concentration.

Severe Chronic Nephritis.—Cases of persistent marked albuminuria with casts, of severe general disturbances, of retinal changes, cases confined to the hospital but showing no uremic symptoms—such patients are included in this class. Table XII shows the results of the blood examination of 12 cases of advanced chronic nephritis. The non-protein nitrogen varied from 40 to 170 mg., and the urea from 15 to 110 mg. per 100 c.c. of blood. The uric acid was increased in every case. The creatinine was increased in 9 cases. The phenolsulphonephthalein output was zero

TABLE I—PROSTATE CASES

Case	Age	Blood pressure	Urine analysis			Blood analysis—Mg. per 100 c.c.				Remarks
			Phenol-phthalein percent	Albumin	Microscop.	Nonprotein N.	Urea N.	Uric acid	Creatinin	
5342	43		53	Neg.	Neg.	41	19	2.8	1.0	Simple hypertrophy; improved.
1877	76	130-65	13	Neg.	Pus cells.	30	15	4.2	1.0	Prostatic calculi; improved.
2201	73	175-170		Neg.	Neg.	30	15	3.6	1.8	CO ₂ combining power, 50 vol. percent; improved.
2300	65	150-90	6	Trace	Pus cells.	26	13	4.4	1.2	Simple hypertrophy; improved.
5339	62	130-85	52	Trace	Pus cells.	40	29	3.8	1.0	Died of pneumonia.
5359	62	130-85	41	Trace	Pus cells.	31	25	2.3	0.8	Simple hypertrophy.
8555	49	126-50	48	Trace	Pus and erythrocytes.	20	10	3.3	0.8	CO ₂ combining power, 69 vol. percent.
8596	72		54	Trace	Neg.	28	14	5.4	1.0	CO ₂ combining power, 85 vol. percent; died.
8623	67	175-130	35	Trace	Neg.	25	12	5.0	1.0	CO ₂ combining power, 59 vol. percent; died.
5183	47			Trace	Erythrocytes.	40	24	1.9	1.1	Simple hypertrophy; died; pneumonia.

TABLE II—CARCINOMA

Case	Age	Blood pressure	Urine analysis			Blood analysis—Mg. per 100 c.c.				Remarks
			Phenol-phthalein percent	Albumin	Microscop.	Nonprotein N.	Urea N.	Uric acid	Creatinin	
555	50	160-50	29	Neg.	Neg.		25	4.1	2.5	Cancer of liver; died; no uremic symptoms.
.....	57	100-70		Neg.	Neg.		12	2.7	1.5	Cancer of stomach; CO ₂ 65 vol. percent.
1892	49	135-105	50	Trace	Pus and erythrocytes.	38	19	2.8	1.5	General carcinoma.
2590	63		55	Trace	Pus and erythrocytes.	24	12	4.4	1.5	Carcinoma of bladder; McClean ratio, 150.
1595	49	150-40	78	Neg.	Neg.	21	10	2.3	1.3	Cancer of rectum.
1540	63	158-96	80	Neg.	Neg.	26	12	4.2	1.9	Cancer of stomach.
7687	62	230-120		Trace	leukocytes and erythrocytes.	27	9	2.2	1.0	Cancer of kidney.

TABLE III—ASTHMA CASES

Case	Age	Blood pressure	Urine analysis			Blood analysis—Mg. per 100 c.c.				Remarks
			Phenolphthalein percent	Albumin	Microscop.	Nonprotein N.	Urea N.	Uric acid	Creatinin	
267	17			Neg.	Neg.		9	2.0	1.0	Condition improved. Improved. Improved. Improved. Improved. CO ₂ combining power, 59 vol. percent; died; no uremic symptoms.
137	62	150-82	45	Neg.	Neg.	26	11	2.0	2.0	
7399	67	130-90	46	Neg.	Neg.	30	12	3.3	1.9	
2798	37	110-64	48	Neg.	Neg.	26	15	1.3	1.9	
303	56	120-86	26	Neg.	Neg.	37	13	5.1	3.3	
8642	36	136-96		Trace	Few hyalin and gran. casts		11	2.3	1.0	

TABLE IV—GOUT AND ARTHRITIS

Case	Age	Blood pressure	Urine analysis			Blood analysis—Mg. per 100 c.c.					Remarks
			Phenolphthalein percent	Albumin	Microscop.	Nonprotein N.	Urea N.	Uric acid	Creatinin		
9004	65	150-90		Neg.	Neg.		11	4.2	0.8	Enormous gouty deposits in hands; heavy beer drinker. CO ₂ combining power, 72 vol. percent. Acute articular rheumatism; lues. Gout; tophi in ears; fifteen years' duration. Chronic arthritis deformans. Chronic arthritis deformans. Subacute rheumatism. Acute gonorrheal rheumatism. Arthritis deformans. Acute rheumatic fever. Acute gonorrheal rheumatism. Chronic rheumatism. Endocarditis.	
221	60			Neg.	Neg.		13	2.5	1.0		
240	24	140-96		Neg.	Neg.		10	2.3	1.0		
9556	54		29	Neg.	Neg.		12	3.3	1.0		
7289	42	104-64		Neg.	Neg.	30	11	2.7	1.0		
5398	51	126-100		Trace	Neg.	58	22	4.4	1.5		
2350	57	170-89	69	Neg.	Neg.	32	13	1.0	1.0		
4459	47	110-78	45	Trace	Mus. cells.	32	23	3.3	1.5		
1668	32	112-68	45	Neg.	Neg.	15	7	1.9	0.9		
1433	27	125-56	19	Neg.	Neg.	23	10	0.7	0.4		
8191	39	105-56	17	Neg.	Neg.	32	15	1.9	2.5		
1193	76	158-76	48	Neg.	Neg.		13	0.4	1.9		

TABLE V—DIABETES MELLITIS

Case	Age	Blood pressure	Urine analysis				Blood analysis—Mg. per 100 cc.						Remarks	
			Albumin	Sugar percent	Microscop.	Acetone	Diaetic acid	Non-protein N.	Urea N.	Uric acid	Crea- tinin	Sugar percent		CO ₂ com- bining power, vol. percent
7556	50	175-105	Trace	3	Neg.	Large amount.	Neg.	28	10	2.3	8	21	49	Improved.
120	56	169 108	Neg.	2.5	Neg.	Neg.	Neg.	37	16	1.0	2.3	18	59	Improved.
5016	53	137-98	Neg.	3.7	Neg.	Neg.	Neg.	22	10	2.5	1.0	22	22	Improved.
5111	45	137-98	Neg.	3.8	Neg.	Large amount.	Trace	29	12	2.2	8	28	58	Improved.
8902	63	104-70	Trace	6	Hyalin casts.	Neg.	Neg.	12	12	2.7	1.0	16	50	Improved.
1841	56	198-115	Trace	1	Neg.	Neg.	Neg.	26	10	1.7	6	27	65	Improved.
283	35	130-90	Trace	2	Neg.	Trace	Neg.	115	5.5	1.7	6.0	86	48	Myocarditis.
3810	45	110-78	Trace	3	Few hyalin and casts	Large amount.	Mod. amount.	31	16	6.5	1.3	22	25	Pneumonia; died.
														Died.

TABLE VI—ORGANIC HEART DISEASE

Case	Age	Blood pressure	Urine analysis				Blood analysis—Mg. per 100 c.c.				Remarks
			Wassermann	Phenolphthalein percent	Albumin	Microscop.	Non-protein N.	Urea N.	Uric acid	Creatinin	
778	51	150-80	0	50	Neg.	Neg.	29	11	3.0	1.7	Endocarditis with decompensation; chronic rheumatism.
1610	40			53	Trace	Ocas'l hyalin cast	25	11	1.7	1.1	Myocarditis; improved.
1165	65			45	Ft. tr.	Ocas'l gran. cast	15	15	2.4	1.0	Myocarditis; died.
7993	33	150-20	2+	20	Large amount.	Many hyalin casts	11	11	1.5	1.0	Mitral and aortic lesions.
3032	37	110-0	0	80	Neg.	Neg.	17	11	3.1	2.4	Myocarditis; improved.
18	52	110-75	0	58	Ft. tr.	Neg.	26	11	3.1	1.5	Myocarditis; improved.
448	26	110-75	0	16	Neg.	Neg.	23	12	2.0	2.0	Luetic endocarditis; fundi normal.
1937	68	130-60		59	Neg.	Neg.	35	15	1.3	2.6	Chronic endocarditis.
1861	68	180-120		18	Neg.	Neg.	30	15	1.3	1.4	Chronic endocarditis.
4635	17	180-120			Trace	Neg.	26	12	5.1	1.7	Alcoholic myocarditis with decompensation; improved.
2523	37	100-68	0		Neg.	Many hyalin and gran. casts.	31	16	3.7	2.8	Luetic myocarditis.
398	53	190-108	1+	12	Neg.	Neg.	12	16	1.0	1.9	Rheumatic endocarditis; died.
											Endocarditis with decompensation; improved.

TABLE VII—MISCELLANEOUS CASES

Case	Age	Blood pressure	Phenolphthalein percent	Blood analysis—Mg. per 100 c.c.					Remarks
				Nonprotein N.	Urea N.	Uric acid	Creatinin	Sugar percent	
728	11	138-94	89	.....	9	1.8	1.0	10	Chorea; cured.
9334	28	126-50	75	21	9	2.3	1.0	07	Liver abscess; operated; cured.
7822	56	.....	.....	.....	10	1.3	1.0	10	Hemihypertrophy; CO ₂ combining power, 85 vol. percent.
780	24	118-80	80	.....	10	2.0	1.0	08	Neurosis.
8630	34	164-105	.....	.....	17	2.3	1.0	06	Breast tumor; patient died; CO ₂ combining power, 58 vol. percent.
573	60	156-100	38	.....	11	2.1	1.5	10	Pulmonary tuberculosis.
8966	68	184-108	.....	.....	12	1.9	8	13	Apoplexy; died.
8777	57	132-68	34	.....	16	2.5	2.0	16	Lymphatic leukemia; (CO ₂ combining power, 51 vol. percent.
7161	39	126-80	.....	26	10	2.5	1.0	11	Angina pectoris; CO ₂ combining power, 57 vol. percent.
4876	23	125-98	.....	28	13	1.1	1.1	09	Tic; CO ₂ combining power, 48 vol. percent.
5264	28	.....	44	33	17	3.1	1.1	11	Chronic appendicitis.
8285	30	96-54	65	.....	10	.....	1.9	.....	Stricture of rectum; lues.
4273	37	110-80	44	40	22	2.0	2.0	10	Chronic rheumatic endocarditis.
5263	37	110-80	44	29	13	2.6	2.6	.....	Hyperacidity.
139	30	156-86	41	22	13	3.6	2.6	.....	Chorea toxica poisoning.
195	59	156-86	.....	24	10	1.3	9	08	Vomiting of pregnancy.
6422	25	110-63	52	21	10	5.2	1.8	.....	Chronic endocarditis; chronic rheumatism; gastroptosis.
2607	31	.....	.....	35	12	2.3	2.1	10	Catarthal jaundice.
1552	55	110-76	98	28	13	.....	1.1	.....	Intenaza; cured.
138	33	114-70	65	21	10	.....	1.7	08	Chorea.
5223	23	114-70	65	20	10	3.0	1.0	11	Alcoholic neuritis.
5779	44	156-108	.....	.....	.....	3.7	1.3	11	Nexus linearis.
1144	13	114-44	.....	21	10	2.7	1.0	10	Acute cystitis.
564	19	118-88	12	.....	8	2.9	1.0	11	Catarthal jaundice; CO ₂ combining power, 71 vol. percent.
459	15	108-64	73	.....	.....	2.1	1.0	06	Hemiparesis.
229	54	116-76	42	.....	11	3.3	1.4	14	Nephroposis.
5241	42	140-90	89	29	12	3.3	1.0	.....	Neurasthenia.
2407	35	.....	35	35	15	1.4	9	09	Urethral stricture.
5495	63	144-88	61	33	16	1.0	1.0	16	Banti's disease; cholesterol, 87 mg. per 100 c. serum.
3216	25	117-50	12	23	12	1.2	2.9	16	Acute endocarditis.
1528	34	144-78	58	38	17	1.9	1.8	11	Nephrolithiasis.
2952	20	.....	55	25	13	1.9	2.1	12	Chronic poisoning.
1102	52	150-90	.....	.....	16	3.1	1.5	14	Nephrolithiasis.

TABLE VIII—CHRONIC HEART DISEASE WITH NEPHRITIS

Case	Age	Blood pressure	Urine analysis					Blood analysis—Mg. per 100 c.c.					Remarks	
			Phenol-phthalein percent	Vol.	Specific gravity	Albumin	Microscop.	Total N. gms.	Urea N.	Non-protein N.	Urea N.	Uric acid		Creatinin
7494	59	120-60	27	1700	1012	Trace	Mod. hyalin and gran. casts			10	2.1	0.8	Anasarca; lues; aortic regurge; optic atrophy; improved.	
2506	48	102-70	52	600	1035	Neg.	Neg.			33	16	1.0	1.5	Passive congestion; rheumatism; lues; alcoholism; improved.
262	58	170-135	29	3620	1012	Ft. tr.	Pus cells; few casts.	16	12	18	13	1.1	2.7	Anasarca; alcoholism; double mitral; fundi normal; improved.
220	35	130-50	49	1825	1020	Trace	Few hyalin and gran. casts			11	3.1	1.0	Rheumatism; anasarca; double mitral; improved.	
8886	51	136-100		650	1015	Trace	Ocas'l gran. cast			15	3.1	1.0	Double mitral; rheumatism; CO ₂ combining power, 62 vol. percent; improved.	
3097	47	150-104	15	520	1021	Ft. tr.	Many hyalin and gran. casts	9	7.2	27	16	3.0	2.4	Mitral regurge with decompensation; alcoholism; improved.
2812	49	191-56	14	100	1022	2 gm.	Many hyalin and gran. casts	5	3.1	26	13	5.0	1.3	Mitral regurge with decompensation; lues; improved.
8414	70	194-118			1025	Trace	Many pus cells			48	19		1.0	Mitral regurge; anasarca; hemorrhage of fundus; rheumatism; died.
828	54	180-150	55	2000	1020	Mod.	Hyalin and gran. casts, pus cells erythrocyte amount.			16	2.7	1.5	Myocarditis; alcoholism; improved.	
459	44	100-70	0	800	1020	Trace	Hyalin and gran. casts			110	55	7.0	3.0	Anasarca; pericarditis; broncho-pneumonia; combining power, 69 vol. percent; died.
4577	57	210-140	32		1005	Trace	Hyalin and gran. casts			35	22	1.7	1.0	Myocarditis; alcoholism; rheumatism; CO ₂ combining power, 39 vol. percent; improved.
6164	41	148-76	34	880	1021	Mod.	Gran. casts; pus cells	9	6	29	13	3.2	2.5	Mitral regurge with decompensation; lues; alcoholism; rheumatism; died.
861	53	150-106	75	420	1010	Ft. tr.	Ocas'l hyalin, gran. casts	4	3.4	30	15	1.8	1.5	Anasarca; alcoholism; lues; CO ₂ combining power, 84 vol. percent; died.
4253	53	120-80			1015	Ft. tr.	Hyalin and gran. casts			20	13	2.2		Mitral regurge; rheumatism; CO ₂ combining power, 40 vol. percent; improved.

TABLE IX—ACUTE NEPHRITIS

Case	Age	Blood pressure	Wassermann	Phenolphthalein percent	Urine analysis					Blood analysis—Mg. per 100 c.c.				Remarks
					Specific gravity	Albumin	Microscop.	Total N. gms.	Urea N.	Non-protein N.	Urea N.	Uric acid	Creatinin	
1300	51	110 76	neg.	55	1012	8 gms.	Few gran. casts; pus and erythrocytes.	10	8.0	45	23	3.0	2.5	Slight edema; improved.
1094	32	138 90	neg.	40	1012	4 gms.	Many gran. casts; pus and erythrocytes.	13	6.3	49	37	4.2	1.1	Improved.
2874	4	85	neg.	4	1026	Mod. amount.	Many gran. casts; erythrocytes.			170	116	2.5	5.0	Broncho-pneumonia.
Same					1024	Mod. amount.	Casts, pus and erythrocytes.			190	106	2.0	4.4	Anuria; irritable.
Same	18	132 84	50	73	1012	F. tr.	Few gran. casts.			93	46	tr.	2.4	Spinal fluid.
2502					1008	2 gms.	Many hyaline gran. casts.	3	1.3	19	10	0.5	2.3	Marked improvement.
Same	40	136 80	neg.	25	1008	9 gms.	Occas'l gran. cast.	9	6.3	21	10	5.4	0.8	Anasarca.
5975	40	136 80			1018	Trace	Pus and erythrocytes.			23	12	0.6	0.9	Improved.
7782	30	138 80			1015	Trace	Pus and erythrocytes.			13	5.0	1.0	1.0	Edema of legs; improved.
Same					1018	Trace	Pus cells.	3	2.0	152	110	7.0	9.0	Acute mercury poisoning.
					350					30	16	5.0	2.0	Improved.

TABLE XI—MILD CHRONIC NEPHRITIS WITHOUT EDEMA

Case	Age	Blood pressure	Urine analysis						Blood analysis—Mg. per 100 c.c.				Remarks		
			Phenol-phthalon percent	Vol.	Specific gravity	Albumin	Microscop.	Total N. gms.	Urea N.	Non-protein N.	Urea N.	Uric acid		Creatinin	
846	40		23	1500	1015	Trace	Occas'l hyalin casts.	13	9.9	32	18	1.6	1.7	Rheumatism; alcoholism; improved.	
7824	37	110-60	23	750	1026	Trace	Few gran. casts.			25	12	1.6	0.9	Alcoholic cirrhosis hepatitis; improved.	
5117	66				1020	Trace	Few gran. casts.			26	19	2.2	0.9	Gangrene of foot; CO ₂ combining power, 46 vol. percent; improved.	
4518	51	115-80	50	2620	1006	Trace	Occas'l hyalin casts.	7	4	20	12	1.2	2.5	Gangrene of toes; CO ₂ combining power, 42 vol. percent; improved.	
8136	46	190-10	9	880	1020	1.8 gms.	Many hyalin and gran. casts, pus and erythrocytes.				24	2.4	2.5	Acute exacerbation of a chronic nephritis; CO ₂ combining power, 61 vol. percent; improved.	
3400	64	171-	55		1010	Trace	Many gran. casts.			35	17	6.2	2.1	Myocarditis; alcoholism; improved.	
532	50	114-70	16	1070	1014	Trace	Many gran. casts.	7	4.1		12	2.7	1.9	Chronic endocarditis; improved.	
8862	51	180-100	60	800	1015	Trace	Few hyalin and gran. casts.				23	11	3.8	1.0	Arteriosclerosis; improved.
1396	38		17	2600	1014	Ft. tr.	Pus cells.			35	13	2.8	0.9	Interstitial nephritis renal calculi; nephrectomy; improved.	

TABLE X—MILD CHRONIC NEPHRITIS WITH EDEMA

Case	Age	Blood pressure	Urine analysis					Blood Analysis				Remarks		
			Phenol- phthalien percent	Albumin	Vol.	Specific gravity	Microscop.	Total N. gms.	Urea N.	Non- protein N.	Urea acid N.		Cre- atinin	
212	35	174-136	13	Large amount.	1180	1016	Few gran. and hyalin casts.	7	4.1	37	18	2.8	3.0	Anasarca; alcoholism; improved.
565	59	172-76		Trace	360	1020	Oceas 1 hyalin and gran. casts.			11	11	3.8	1.0	Anasarca; died.
8176	55	140 90		Ft. tr.	750	1026	Few gran. casts.			17	17	3.1	0.8	Anasarca; CO ₂ combining power, 68 vol. percent; died; bronchopneu- monia.
8103	53	142-100	12	Mod. amount.	500	1024	Few hyalin and gran. casts.			16	16	3.1	1.0	Alcoholic cirrhosis hepatis.
4969	57	132-64	25	Neg.		1004	Few gran. casts.			23	14		0.3	Edema of extremities; myocarditis; improved.
77	73	230 140		Neg.	1350	1024	Hyalin and gran. casts.			16	16	2.0	1.5	2 percent sugar in urine; alcoholism; improved.
772	45	158-84	23	1.7 gms.	1770	1016	Many hyalin and gran. casts.	12	9.0	34	22	4.6	0.8	Edema of extremities; alcoholism; im- proved.
1953	58	150 116	31	Mod. amount.	800	1010	Many hyalin and gran. casts.	5	3.1	26	14	3.3	1.5	Myocarditis with decompensation; improved.
1676	46	138-72	81	Neg.	880	1017	Few hyalin and gran. casts.	10	7.2	27	10	3.6	1.5	Alcoholic cirrhosis; improved.
5695	52	190 80	40	Large amount.	1150	1012	Many hyalin and gran. casts.			25	12	2.5	1.3	Myocarditis; asthma; CO ₂ combining power, 72 vol. percent; improved.
2106	67	200 115	51	Trace	450	1021	Few gran. casts.			20	9	1.5	0.7	Anasarca; rheumatism; CO ₂ combining power, 48 vol. percent.
1977	50	198-118		Mod. amount.	370	1028	Many hyalin and gran. casts.	4	2.0	16	16	2.1	0.9	Hemiplegia; alcoholism; improved.
2146	61	200 108	27	Mod. amount.	650	1021	Hyalin and gran. casts.			32	18	3.6	2.0	Endocarditis; hemiplegia; unimproved.
9920	69	230 126		Trace	630	1020	Few casts; pus and erythrocytes.			25	25	3.6	2.0	Gangrene of foot; died after amputa- tion; CO ₂ combining power, 80 vol. percent.
2137	56	300-135	11	Trace	770	1017	Many hyalin and gran. casts.	7	6.0	25	12	2.6	1.1	Alcoholism; CO ₂ combining power, 48 vol. percent; unchanged.
309	59	210 140	17	Mod. amount.	620	1011	Hyalin and gran. casts.	5	1.0	59	31	2.7	1.1	Optic neuritis; alcoholism; improved.
7194	42	160 112	34	Trace	800	1014	Many hyalin and gran. casts.			40	16	2.0	1.5	Myocarditis with decompensation; 40 percent combining power.
9065	52	164 76	17	Trace	1320	1014	Few gran. casts.	7	8	24	12	7.2	1.5	Anasarca; alcoholism; improved.
3655	50	132 88	11	Trace	1000	1010	Oceas 1 hyalin cast.			13	22	4.1	1.1	Edema of extremities; CO ₂ combining power, 37 vol. percent; improved.
2110	58	230 100	21	2 gms.	590	1013	Many hyalin and gran. casts.	1	2.2	41	25	2.7	2.2	Edema of legs; McLean index, 70 vol. percent; unchanged.
5624	32	183 106		5 gms.	865	1020	Gran. and hyalin casts.	10	6	27	11	5.0	1.0	Edema of legs and abdomen; im- proved.
1017	54		38	Mod. amount.	1460	1009	Pus cells.	5	3.2	26	10	3.5	2.2	Endocarditis with decompensation; improved.
158	49	1661-08b	19	Mod. amount.	820	1013	Neg.	4	2.3	38	18	3.0	2.1	Fluid in chest and legs; rheumatism; coma with increased edema; fundi normal; no convulsions; deliriousness; CO ₂ combining power, 48 vol. percent; discharged after five months as im- proved.
1185	13	131 81 130 95	52	Trace Mod. amount.	1140 1350	1011 1012	Oceas 1 hyalin cast Few hyalin gran. casts.	10	8.0	30	15	3.8	1.5	Anasarca; alcoholism; improved.
2169	54	140 60	33	Trace	1200	1030	Few gran. casts.			24	13	2.5	0.9	Edema of eyes and legs; alcoholism; improved.

TABLE XII—SEVERE CHRONIC NEPHRITIS

Case	Age	Blood pressure	Urine analysis					Blood analysis—Mg. per 100 c.c.				Remarks		
			Phenolphthalein percent	Vol.	Specific gravity	Albumin	Microscop.	Total N. gms.	Urea N.	Non-protein N.	Urea N.		Uric acid	Creatinin
7490	42	232-128	5	480	1020	Large amount.	Few hyalin casts.		1.5	42	19	5.7	1.8	Chronic endocarditis with decompensation; optic atrophy; died; double pneumonia.
9917	46	180-120	30	800	1020	M.c.d. amount.	Hyalin and gran. casts.	10	7.0		20	1.1	2.0	Alcoholic cirrhosis hepatis; CO ₂ combining power, 75 vol. percent; died; anasarca.
5518	64	122-65		600	1015	Mod. amount.	Many gran. casts.			62	32	5.0	1.3	Alcoholic cirrhosis; anasarca; no convulsion; died.
2241	25	198-108	0	1550	1011	1.0 gm.	Many gran. casts.	8	7.1	148	110	4.5	13.0	Alcoholism; fundus normal; McLean index, 6; died; edema of larynx.
5376	69	168-170	0		1008	Trace	Occas' gran. casts.			111	83	5.0	5.5	Myocarditis; no uræmic symptoms; died.
1418	38	204-126	12	350	1012	Trace	Many hyalin and gran. casts.			67	32	6.0	5.0	Anasarca; optic neuritis; died under ether narcosis for kidney decapsulation.
6657	26	180-126	4	2450	1012	Large amount.	Few gran. casts; erythrocytes and pus cells.	13	9.0	170	63	3.6	3.2	Edema of extremities; fatty degeneration of retina; condition unchanged.
1946	65	240-150	9	1400	1008	Large amount.	Hyalin and gran. casts.	5	3.6	100	50	5.0	5.0	Alcoholic myocarditis; optic neuritis; with albuminuric retinitis; condition improved.
6561	40	210-130	0	1100	1011	Mod. amount.	Gran. casts; erythrocytes.	5	2.9	78	67	3.2	6.0	Endocarditis with decompensation; alcoholism; albuminuric retinitis; condition improved.
			0		1010	Mod. amount.	Gran. casts.			106	64	5.4	9.3	Chronic convulsions; condition unimproved.
1070	52	206-126	33	3200	1009	Trace	Few pus cells.	15	12	40	19	4.4	1.5	Chronic mercury poisoning; mercury found in the urine; discharged and readmitted several times.
			36	1720	1016	Pt. tr.	Few gran. casts.	13	10	43	21	3.0	2.9	CO ₂ combining power, 76 vol. percent; died of myocarditis.
			50	890	1021	Mod. amount.	Hyalin and gran. casts.	8.8	5.4	15	2.5	1.5	1.5	Anasarca; discharged as unimproved.
7476	58	228-112	0	440	1008	Mod. amount.	Many gran. casts.	3.0	1.0	111	55	4.2	4.5	Edema of extremities; tuberculosis of right kidney; albuminuric retinitis unimproved.
7816	52	210-130	0	1400	1008	1.4 gms.	Few gran. casts; erythrocytes	5.0	3.6	72	37	4.2	6.4	Edema of extremities; tuberculosis of right kidney; albuminuric retinitis unimproved.

TABLE XIII—CHRONIC NEPHRITIS WITH UREMIC SYMPTOMS

Case	Age	Urine analysis				Blood analysis—Mg. per 100 c.c.					Remarks
		Phenolphthalein percent	Albumin	Microscop.	Non-protein N.	Urea N.	Uric acid	Creatinin	Sugar percent		
5374	35	0	Large amount.	Many gran. casts.	144	111	8.3	8.3	10	General anasarca; endocarditis; semi-comatose; left the hospital.	
3404	45		Trace	Many pus and erythrocytes.	200	83	9.2	6.0	17	Pyelonephrosis; CO ₂ combining power, 23 vol. percent; collapse with vomiting; died in coma five days after admission.	
8705	59	0	Large amount.	Granular casts	120	55	10.0	8.0	11	CO combining power, 26 vol. percent; died in coma one day after admission.	
7259	24	9	Trace.	Many hyalin and gran. casts	100	70	5.0	4.0		11-15-16; headache, nausea, vomiting.	
Same		1	Trace	Few hyalin and gran. casts	134	93	6.0	6.0		11-24-16.	
Same		0	Trace	Few gran. casts.	150	140	9.0	6.0		12-10-16; discharged improved; died several months later in uremic coma.	
704	50		Large amount.	Few hyalin and gran. casts.	72	27	9.0	4.0		Died within 12 hours.	
3782	40	0	Large amount.	Hyalin and gran. casts	144	100	8.3	10.0	11	Double mitral murmur; general anasarca; retinal hemorrhages; died 5 days after admission.	
3343	44	0	Trace	Hyalin and gran. casts, pus and erythrocytes.	100	67	4.5	6.4	16	Edema of legs; albuminuric retinitis; died eight days after admission.	
3044	28	0	Trace	Pus, erythrocytes and gran. casts.	45	26	2.8	3.5	11	5 days of anasarca; died in hepatic coma.	
Same					148	128	10.0	16.0	18	semi-comatose until death, 6-9-16.	
3319	56	0	Trace	Pus cells.	124	100	13.4	5.5	12	CO combining power, 23 vol. percent.	
										Endocarditis; CO ₂ combining power, 10 vol. percent; died 2 weeks after admission.	
Same					110	91	Trace	6.4	12	Same as above.	
3164	47	5	Large amount.	Hyalin and gran. casts	95	65	1.2	5.6	17	Myocarditis; anasarca; died 13 days after admission.	
Same		5	Large amount.	Hyalin and gran. casts	100	72	7.3	5.5	13	Myocarditis; anasarca; CO ₂ combining power, 15 vol. percent; died.	
3006	67	0	Trace	Few leukocytes.	250	150	10.0	18.7	2	Endocarditis; anasarca; cholesterol, .40186 gm. per c. serum.	
3123	55	0	Large amount.	Many hyalin and gran. casts	144	83	10.0	6.0	15		

TABLE XIV—CHRONIC NEPHRITIS WITH UREMIA

Case	Age	Blood pressure	Urine analysis				Blood analysis				Remarks	
			Phenol- phthalein percent	Albumin	Microscop.	Total N. gms.	Urea N.	Non- protein N.	Urea N.	Uric acid		Crea- tinin
7463	23	166-106	9	Large amount.	Few gran. casts.	8	4.5	110	45	3.2	4.1	11-16-15; general anasarca; severe headaches.
Same			27	Large amount.	Few gran. casts.			59	48	3.7	1.0	12-16-15; tremors.
Same		144-90	18	Large amount.	Many hyalin and gran. casts.							
Same			9			5		55	26	2.2	4.2	1-24-16; headaches and tremors.
Same			0	Large amount.	Few casts.		2.8	104	43	2.3	3.3	2-14-16; gastric distress.
Same			0			8		40	25	1.7	3.1	2-28-16; no symptoms; feels better.
Same		178-109	4					48	19	2.4	2.8	3-7-16; in good condition.
Same								77	24	2.3	5.3	4-17-16; McClean ratio, 20*.
Same			0					106	55	7.0	13.0	Cholesterol, 797 mg. per 100 c.c. serum.*
Same				Trace	Few gran. casts			111	67	7.0	14.0	5-16-16; CO ₂ combining power, 18 vol. percent.*
Same			0	Trace	Pus and erythrocytes.			100	67	8.4	12.8	5-16-16; cholesterol, 640 mg.*
Same								75	60	Trace	3.3	5-16-16; spinal fluid.*
Same		170-94	0	Large amount.	Pus and gran. casts			141	100	12.5	13.4	5-26-16; cholesterol, 497 mg.*
												5-28-16; cholesterol, 418 mg.*;
												5-28-16; cholesterol, 338 mg.*;
												convulsions and comat. died.

*Convulsions daily; coma and semi-coma; irrational.

in 9 patients; these cases also showed a marked retention. In 10 cases the urea excretion varied from 30 to 88 percent of the total nitrogen. The blood pressure was increased in all but one case. In one case with marked retention the McLean ratio was six.

Uremia.—Tables XIII and XIV show the result of the blood analysis of 13 cases of chronic nephritis with uremic symptoms. The non-protein nitrogen varied from 72 to 150 mg. (except case 7463), the urea from 26 to 150 mg., the uric acid from 1.2 to 18.7, and the creatinine from 3.5 to 16 mg. per 100 c.c. of blood. Comparison with the normal figures given in the earlier part of this paper shows to what a marked degree retention has occurred in these cases. The phenolsulphonephthalein elimination was markedly decreased, being zero in nearly every case. The CO₂ combining power was also diminished to a marked degree in the cases examined for acidosis. A spinal puncture was done on case 3319 and a considerable increase in the non-protein constituents of the fluid was observed; only a trace of uric acid was found. The blood pressure in all but one case was increased.

A careful study of a typical case over a considerable period of time is shown in 7463. In the early part of November, 1915, the blood analysis showed a retention of all the nitrogenous constituents; the urine contained albumin and casts, and only 50 percent of the total nitrogen was eliminated as urea. The phenolsulphonephthalein excretion was 7 percent. Clinically, the patient was going into uremia. One month later the patient showed a slight improvement; the blood showed a decrease in non-protein nitrogen and a lowered creatinine concentration. The phenolsulphonephthalein elimination was 77 percent. Until March 7, 1916, the patient's condition seemed to improve, the blood analysis varying but slightly; the urinary urea elimination being 87 percent of the total nitrogen. The blood figures returned almost to normal. However, on April 17, 1916, the blood figures again rose, reaching the very high figures on May 26. The patient died 4 days later. On May 10, a spinal puncture was done and the fluid showed a marked increase in the non-protein nitrogen constituents, and also a trace of uric acid. During this time the phenolsulphonephthalein excretion was zero and the McLean ratio was 20. The clinical picture was that of a typical case of uremic convulsions and coma.

It is interesting to note that with the increase of the non-protein nitrogen constituents, the cholesterol* content of the blood serum progressively decreased. The cholesterol diminished from 798 mg. to 339 mg. per 100 c.c. blood. Henes²⁴ has found that in severe nephritis with uremia a fatal termination of the disease is usually

*The cholesterol determinations were done by Dr. Edwin Henes.

preceded by a progressive decrease in the cholesterol content of the blood. Myers and Lough²⁵ have shown that in severe nephritis with uremic symptoms the progressive increase of creatinine indicated an early fatal termination.

SUMMARY.

The chemical analysis of the blood was done in 173 hospital cases.

In cases of prostatic disease, cancer, asthma, arthritis, organic heart disease, and a large number of miscellaneous cases, free from renal disease, the blood figures for the non-protein nitrogenous constituents were within normal limits.

One case of renal asthma showed an increased creatinine and uric acid concentration, and a diminished phenolsulphonephthalein output.

In two cases of gout there was an increased uric acid concentration.

The blood sugar was increased in all the cases of diabetes; two patients with a diminished CO_2 combining power died in coma.

In organic heart disease with nephritis, one case showed a marked retention of all the non-protein nitrogenous constituents; 5 cases showed an increased uric acid concentration.

Four cases of acute nephritis showed a retention of all the nitrogenous constituents at the onset of the disease; the other cases showed an increased uric acid concentration. One case had an increased concentration of non-protein nitrogen, urea, creatinine and only a trace of uric acid in the spinal fluid. In mild chronic nephritis a majority of the cases showed an increased uric acid concentration and a diminished phenolsulphonephthalein excretion.

All cases of severe chronic nephritis had a moderate retention of nitrogenous constituents as well as a low phenolsulphonephthalein output.

Thirteen cases of severe chronic nephritis with uremic symptoms showed very marked retention of nitrogenous products. The phenolsulphonephthalein output was zero in almost every case. The cholesterol in one case decreased markedly as the patient became moribund. The CO_2 combining power of the blood plasma was diminished in the cases examined for acidosis.

CONCLUSIONS.

1. In diabetes the treatment may be guided by the blood examination, for increased sugar concentration, and the degree of acidosis by the CO_2 combining power of the blood plasma.

2. In organic heart disease with nephritis, the blood analysis shows whether retention has occurred; the phenolsulphonephthalein

output in these cases proved to be of little value as cases showing markedly diminished excretion were found to have normal blood figures.

3. The chemical analysis of the blood is of great value in nephritic conditions as regards prognosis. Patients with a marked retention of all the non-protein nitrogenous constituents and a diminished phenolsulphonephthalein excretion have a decidedly poor outlook. A terminal acidosis (diminished CO_2 combining power) is usually fatal in severe nephritis.

4. Conclusions cannot always be drawn from a single blood analysis; several examinations are essential in determining the progress and prognosis of the condition.

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THE COEXISTENCE OF TUBERCULOSIS AND CANCER IN THE SAME ORGAN—REPORT OF TWO SPECIMENS.*

By JONATHAN FORMAN, M.D., and HAZEL CAMERON, B.Sc.

The older writers looked upon tuberculosis as a disease of prime importance predisposing to cancer. During the first half of the nineteenth century, this opinion was reversed on the basis of the Hahnemann system that two diseases of dynamic nature could not exist together; in other words, the less persistent disease must give way to the stronger. Rokitansky and Engel thought tuberculosis was excluded by cancer. Later, when authentic instances of the simultaneous occurrence of cancer and tuberculosis in the same individual were recorded, Rokitansky modified his view and states that "an antagonism prevails between tubercle and carcinoma; whenever their general correlation is susceptible of proof, cancer has seemed to succeed to tuberculosis, tubercle rarely becomes developed after the extinction of cancer and its crisis."¹ Another view which later became popular is expressed in the aphorism of Crazet—"The cancerous early become tuberculous but the tuberculous do not easily become subject to cancer."

Although comparatively few cases of combined tuberculosis and carcinoma have found entrance into the literature, it is doubtful if there exists any real antagonism between the two diseases. The work of Murphy and his associates² suggests, however, the basis for the popularized belief in such an antagonism. Their experiments show that mice which have been splenectomized, are more resistant to tubercle bacilli than normal animals. A study of the blood of such animals shows an increase of as much as 100 per cent. in the lymphocytes. It was further found that mice which had been splenectomized and then exposed to repeated small doses of x-ray which affected primarily the lymphoid tissues, offered much less resistance to the infection than mice which had only been splenectomized.

It was also found that mice previously immunized against, and then inoculated with, a transplantable tumor, developed a marked lymphocytic reaction. Such "cancer immune" mice also showed a greater resistance to the bovine type of tubercle bacilli. It was further shown that if, in such "cancer immune" mice, the lymphocytic reaction is prevented or destroyed by the use of the x-ray, the resistance to tuberculosis is also destroyed. Sittenfeld,³ however, found the destruction of the lymphocytes by the use of

*From the Laboratory of Pathology, Ohio State University.

the x-ray in naturally immune rats did not affect their resistance to tumor inoculation. He also observed that the production of a high degree of lymphocytosis did not afford a defensive mechanism against tumor inoculation.

Certain writers have felt that the tubercle bacillus and its products are a factor, at times, in the production of cancer. Naegeli observed a sub-epithelial tubercular intestinal ulcer which grew against the epithelium and pushed it apart so that it became carcinomatous. Roger Williams observed a like case. Certain observers have also noted that on mucous surfaces, the epithelium undergoes metaplasia to a squamous type as the result of a tuberculous ulcer. Ribbert believed that tuberculosis was a predisposing factor in so far as it furnishes an irritant or stimulus to epithelium. Dixon, Smith, and Fox¹ after animal experimentation, concluded that a combination of living tubercle bacilli and a tuberculin are necessary to effect to any great extent the stimulation of the epithelium.

At the present time, the association of tuberculosis and cancer in the same individual is not considered a rare occurrence. Patients dying of cancer not infrequently show old tuberculous scars in the apices of the lungs, while individuals with well developed progressing tuberculosis do not as a rule have cancer. A compilation of the more recent collections of cases cited by Wolff⁵, gives a total of 5574 cases of carcinoma in which 10.75 percent presented a coexisting tuberculosis. In this country, Moak⁶ found a percentage of 6.6 in his series, while McCasky⁷ found only 1.4 percent of his cancer patients affected with tuberculosis. According to Hoffman⁸, in 633 autopsies performed at the Henry Phipps Institute of Philadelphia, there have been no cases in which tuberculosis and malignant disease coexisted. Sarcomas as well as carcinomas have been reported in association with tuberculosis.⁹

Not only may cancer and tuberculosis exist in the same individual but in the same organ. This form of coexistence is, however, not common. Adler¹⁰ presented a table of 17 cases in which tuberculosis and primary neoplasms of the lung were coexistent. In 1911 von Fraqué¹¹ discussed the sixteen recorded cases of coexisting tuberculosis and cancer in the female genitals. In nine of the cases, the pre-existence of tuberculosis is known. In one the cancer did develop in a tuberculous process; in seven cases, the two were closely adjacent; in five, they were some distance apart. His personal case is that of a carcinoma developing on the floor of an old tuberculous lesion. As examples of the same process, Wolff cites the cylindroma and tuberculosis reported by Lubarsch; the instance of cancer and tuberculosis of the larynx; and that of Schwalbe in which cancer developed upon an old tuberculous ulcer of the caecum. Lapeyre¹² reports a case of tuberculosis and cancer

of the hand. Kellert¹³ cites as further examples of the same thing, the case of Weyenth in which the two diseases were coexistent in the same oesophagus; that of Beale in which the same conditions were found in the larynx.

The presence of carcinoma and tuberculosis in the same organs would appear, therefore, to make the specimens about to be described worthy of record.

CASE I.

Clinical Notes.—Female, age 56, white, native American, family history negative for tuberculosis and cancer. For twenty years the patient has been more or less constipated. For the three months previous to her entrance to the hospital, there has been no movement of the bowels without the aid of a cathartic. During the last week, a movement has been almost impossible to obtain. For the last year the patient has been subject to attacks of "pain in

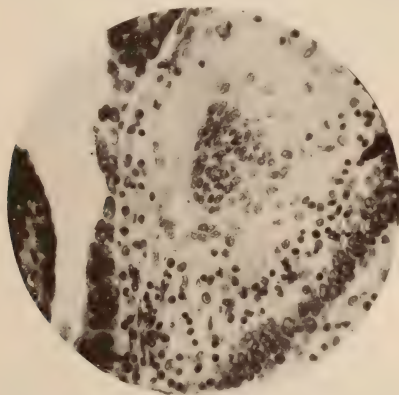


Fig. 1.—A giant cell growing between two of the infiltrating tubules of the carcinoma, taken from an area where both processes intermingle (Case I).

the right side." These attacks recurred about every two weeks. During the last four months they became more frequent until at the time of her entrance to the hospital, there was an almost constant pain in the right lower abdomen. The patient had not, however, lost weight. She had always been a great lover of outdoor life and has been able, until within a few days of her admission, to work hard in the garden. Of late, however, she noticed while at work, that she became tired somewhat more easily than usual. Nevertheless, the patient was not alarmed about her condition. She made a successful attempt to conceal her illness from her friends up to the day of her entrance to the hospital.

Pathological Report.—(Surgical Pathology 17,300.) The specimen is that of a large intestine imbedded in a mass of tissue measuring 10x9x8 cm. Just beneath the peritoneal coat are many small areas resembling tubercles. Upon section, the mass is found to cut with little or no resistance. It is soft and succulent. There are many areas of necrosis of such irregular outline and

poorly defined wall that they appear to be areas of secondary degenerative change and not tubercles. The gut passes through this mass twice. The one segment of the bowel presents a normal sized lumen and an uninvolved mucosa. The outer coats blend into the surrounding mass. The other segment presents a definite constriction of the bowel for a distance of 2 cm. Section of the wall at this point reveals more or less of an obliteration of the normal structure, the whole being replaced by the soft cellular growth of which the mass is, for the most part, composed.

Microscopical examination reveals a typical infiltrating adeno-carcinoma (adenoma malignum). This type of growth appears to occupy most of the mass. There are large areas of secondary necrosis, both of the tumor cells and the invaded structures. Beneath the peritoneum and in the margin of the tumor mass just inside, are many very small tubercles of typical arrangement. Many of these contain giant cells.

Diagnosis.—Adeno-carcinoma and tuberculosis of the cecum.

CASE II.

Clinical Notes. (Abstract).—Mrs. W. D., age 45, white, housewife. Family history negative to malignancy. Father and mother living and well. Two brothers died of tuberculosis and one of "heart trouble." Patient is the mother of three children, the oldest 15 years old. All labors normal. Following the weaning of her last child, the patient became "nervous." The patient has always been constipated but this condition became decidedly worse, during the last few months of life. In May, 1916, the patient complained of feeling weak and "all in." In August she consulted her family physician because of the above complaint and attacks of pain in the epigastrium. She was referred to a gastrologist who, after a careful examination, made a diagnosis of cancer of the stomach. Operation was advised and refused. The patient then changed her physician and March 15, 1917, presented herself to Dr. E. H. Ryan (to whom we are obligated for these notes). About four years ago the patient had been troubled by an enlargement on the left side of the neck, which, after six months' duration, had finally yielded to medical treatment and disappeared. During the past winter, this enlargement had recurred. The patient came to Dr. Ryan because of lack of appetite, loss of weight (60 lbs. since the first of last August), the enlargement of the neck, chills and fever.

The nodules in the neck were tender and painful. There was a palpable mass in the region of the pylorus. Pressure upon this mass produced nausea. Hemoglobin 70, white blood count 12,200. Feces contained occult blood upon four separate examinations. Analysis of stomach contents showed retention, no free hydrochloric acid, and the presence of lactic acid. Diagnosis at that time was gastric cancer and probably tuberculosis of cervical lymph nodes. Later, these cervical nodes broke down, discharged, and were excised for the temporary relief of the patient.

Autopsy Notes (No. 2,784, Abstract).—The body is that of a greatly emaciated female. There are three small areas of ulceration in the line of scar on the neck, the largest of these being 1.5 cm. in diameter.

Thorax Cavity.—The pleural cavities are not remarkable in any way except that one is obliterated by dense adhesions around the apex of the right lung. The lungs are normal in appearance. In the mediastinal space and surrounding the larger vessels at the base of the heart, is a nodular mass, measuring 5x6x8 cm. Upon section it appears to be a group of greatly enlarged lymph nodes which are bound together by adhesions. Many of the nodules are necrotic and closely resemble tuberculous lesions.

Pericardium and Heart.—The parietal pericardium is very much thickened. The pericardial cavity is filled with an abundant fibrinous exudation. On

the visceral layer are numerous small whitish nodules (from 1 to 5 mm. in diameter) which resemble small tubercles.

Abdominal Cavity.—The peritoneal cavity is free from fluid and exudation. The intestines show nothing remarkable. The wall of the stomach along the

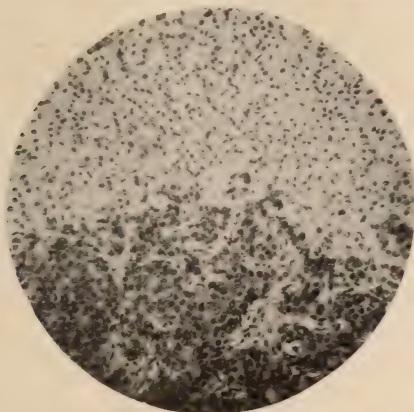


Fig. 2.—Showing the cancer cells invading the liver substance (Case II).

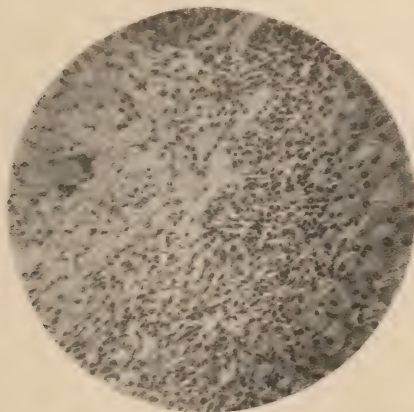


Fig. 3.—Showing in the liver substance the wall of a typical tubercle with giant cell (Case II).

lesser curvature is greatly thickened; the cardiac portion is apparently distended. The pylorus is small and its lumen is nearly obliterated. The upper portion of its circumference is involved in the thickening from the lesser

curvature. Upon section, the gastric mass is composed of dense connective tissue in which are seen many small pearly white "nests." The adjacent lymph nodes are enlarged and upon section resemble closely the structure of the mass in the stomach.

In the retroperitoneal space, is a mass similar to the one in the mediastinum which measures 4x4x5 cm. The liver extends two fingers breadth below the costal margin and is studded with whitish nodules which vary in size from mere specks to 2.5 cm. in diameter. Some of the nodules are umbilicated. Upon section the nodules are found distributed throughout the liver. The centers of many of these nodules are necrotic.

The other organs are not noteworthy upon gross examination.

Microscopical examination of the section from the gastric mass reveals an infiltrating tumor composed of epithelial cells. These cells arrange themselves in quite definite tubules. It is a typical adeno-carcinoma which repeats its structure in the adjacent lymph nodes. The lymph nodes from both the mediastinal and retroperitoneal masses present large areas of caseation occupying almost all of the node and surrounded by a wall of fibroblasts and lymphocytes. Sections from the heart show a visceral pericardium replaced by fibrinous exudation. In the granulation tissue by which the exudation is being replaced, are many small but typical tubercles undergoing organization.

The other organs are not noteworthy except the liver. Here both processes have extended, giving the picture of the two diseases coexisting in the same organ. The larger nodules in the liver are composed of epithelial cells, which form rather definite tubules and are arranged in a rather liberal amount of stroma. The smaller nodules usually present a zone of fibroblasts surrounding a caseous mass. In none of the sections examined, do the two disease processes intermingle. In many instances, however, it is possible to find them quite close together, so that both may be included in the field of the low power objective.

In specimens such as these, presenting a combination of two major diseases, it is always interesting to speculate as to their sequence. In the one specimen is found in a large cancerous mass, a tuberculosis for the most part, confined to the peritoneum and outer coats of the gut. The fact that the tubercles are all very small and of uniform size, would indicate, in this case, the invasion by a large number of tubercle bacilli at a recent date. In the other case, a tuberculosis of the retroperitoneal and mediastinal lymph nodes, is associated with a gastric carcinoma. Both diseases have invaded the liver and are found coexisting in this organ. Here it is impossible to determine definitely which disease antedates the other, though the history would indicate that the cervical tuberculosis antedated the cancer.

In both specimens, tuberculosis and carcinoma are coexisting and intergrowing without any marked influence upon one another, so that it is apparent in these two instances at least that there is no specific antagonism between the two diseases.

SUMMARY.

1. The presence of tuberculosis and carcinoma in the same individual, while not frequent, is probably not rare.

2. The coexistence of the two diseases in the same organ is still less frequent.

3. Two specimens are here reported—a cecum and a liver, from different individuals, in which tuberculosis and cancer are found coexisting.

The authors would here acknowledge their indebtedness to Dr. J. A. Reibel, in whose practice Case I occurred; and to Dr. E. H. Ryan for the clinical notes on Case II; and to Dr. Ernest Scott for the opportunity of studying these specimens.

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PRE-MEDICAL TRAINING IN CHEMISTRY.*

By FREDERICK S. HAMMETT, Ph.D., Harvard Medical School, Boston, Mass.

As a country we are rubbing the sleep out of our eyes and wishing we had split the kindling and brought up the coal the night before. The alarm clock has been ringing for some time, but we have preferred our dreams of ease to the realities of necessities.

The medical profession is awake and trying to start the water boiling, but finds it cannot lay the fire. The wood and coal are at hand, but the knowledge of their proper use is lacking. Now, more than ever, do progressive physicians realize the dependency of successful practice on a well founded knowledge of the chemistry of the human body, and more than ever do they irritably contemplate their lack of preparation.

This lack of preparation in a science so obviously fundamental to rational understanding of the human mechanism as to require no elaboration, at present exists: that a continuation of this condition should be allowed is a parody upon our intelligence.

The futility of expecting the physician to utilize all possible sources of relief to suffering without a knowledge of the application of basic chemical principles to the body reactions is apparent.

It is equally as absurd to expect the medical student to appreciate or assimilate the possibility of chemistry being a practical science for his uses, if he does not have sufficient foundation in this subject, before he enters the medical school.

The medical school is fundamentally a school of applied science. It is where the individual is taught science as applied to the human body. Any attempt to teach a student biological chemistry without his having received an adequate foundation in the fundamental principles of chemistry in general, and to expect him to know much of anything when we are through with him, is as idiotic as to try to teach calculus to men who have yet to know algebra. The foundation must be laid in the pre-medical work.

It is only in recent years that the teaching of elementary chemistry has been dropped from the medical curriculum. Unfortunately, however, even today it is only the few schools interested in turning out doctors instead of groups of men competent to pass State-Board examinations, that have adapted

*Read before the fifty-fifth annual meeting of the American Chemical Society.

themselves to the logical demand of the times as justified by the ever-increasing applicability of chemical science to medical practice, and brought about this necessary change.

It is admitted that plausible excuse for this disorderliness exists. The appearance of chemistry as a real aid to diagnosis and treatment from the Stygian darkness has been not only remarkable for the rapidity of its development, but amazing in its stability. A new phase in medical knowledge has been produced through the pressure of the discoveries of countless investigators. And it is not surprising that the now should-be obsolete system clings tenaciously to the older but invalid conceptions.

It is well recognized that the efficient practice of medicine entails a scientific knowledge of ever widening scope. It is therefore of the greatest importance that a proper selection of scientific information be presented to the prospective medical student for his assimilation. Purposeless instruction, from the standpoint of view of the pre-medical student, is haphazard and yields results that are worse than nothing.

Conscientious objectors will mentally raise the objection that the pre-medical requirements are already well set down in the regulations of the various medical schools and by the American Medical Association. From the quantitative standpoint this is largely true, but from the point of quality the field is barren. And whereas these dicta were sufficient for the time and admirable in that an appreciation of the increasing importance of chemistry to the practice of medicine was shown, yet such advantages are now possible to be derived from a more exact definition of requirements that a change is imperative else stagnation will set in. For, mark you, while directions are given that so much inorganic, and so much organic, and so much advanced chemistry should be given, nothing is said about what of inorganic, and what of organic or what of advanced should be taught. To chemists it is a matter of individual experience that any of the various branches of the science can well occupy the studies of a lifetime.

So why try to make the pre-medical student a chemist. He wants to be a doctor, and he wants to learn what of chemistry there is that can help him to be a better doctor, but instead of getting what he wants he is put through the mill with the students who wish to enter upon chemistry as a life work, gets so far and no farther, wonders what it is all about, takes a good dose of physic in the form of an examination and gets rid of all he had taken in. If the college instructors of pre-medical students should look upon them as a problem in research, the results would never see the light.

Now this pre-medical training in chemistry is essentially a question of *what* instead of *how much*, and the decision as to the sub-

ject matter to be offered for utilization is not especially difficult if one cares to look into a biological chemistry for a few hours. What the pre-medical student needs is to learn the fundamental principles common to all chemical reaction. He does not need encyclopedic details. Principles are to details as granite is to sand. And these principles should be the high points in the work, they should not be obscured by a fog of wearying and relatively unimportant details. Let me illustrate; the understanding of the nature of oxides is a principle, the number and formulae of the oxides of iron is an unessential detail; and again, the phenomena of isomerism is a principle, the ability to enumerate all possible isomerides of a given compound is detail.

Principle must not be subordinated to detail.

Human health and happiness rest to a great degree in the physician's hands. The true physician must be a true diagnostician. He cannot be a diagnostician if he lacks power of observation and ability to carry on deductive reasoning. Where better can he gain this fundamental training than in chemistry? And can he get this point of view in a mind befuddled with inconsequential detail? Another essential attribute of the efficient doctor is technique. The ability to rapidly, smoothly, and accurately carry on delicate manipulations is a prime requisite for adequate medical service. What teaches this better than intensive training in quantitative analysis? Can we conclude from the results handed over to us that these things have been done? We can not.

Any teacher of biological chemistry in a medical school knows how flimsy a chemical structure has been erected in the minds of the students coming to him, and that the information acquired is about as useful as is a cob-web for catching fish.

The causes of this are self-evident. Probably the most satisfying reason lies in the newness of the possibilities of the application of the science of chemistry to diagnosis and treatment. The collegiate instructor has failed to appreciate the progressing utilization of chemistry by the biological sciences. There is a chasm between what the instructor knows and attempts to teach to the pre-medical student and what the pre-medical student needs. And as a result the student falls into the chasm, and is lost. It is the job of the collegiate instructor to bridge the gap through constructive co-operation. The medical school instructor has not been sufficiently insistent on preliminary requirements from a qualitative standpoint, nor has he shown any special inclination to relate the needs of the situation. These facts when coupled with the disinclination of the college teacher of chemistry to break away from the classical and now obsolete methods of teaching and inaugurate a system adapted to the demands of the times give some explanation of what at present confronts us. There is at hand a supply of

potential useful information that lacks efficient assimilation because of the lack of understanding of fundamental principles.

The remedies are obvious. An attempt by the collegiate instructor in chemistry to learn something of what chemistry is doing in biology. A measure of co-operation between teachers of biological chemistry and the pre-medical instructors. A willingness on the part of the latter to recognize the validity of the wishes of the former. An outline of preparedness from the qualitative point of view. And a realization of the fact that true preparedness rests on understanding, while understanding can come only when detail is subordinated to principle.

CARCINOMA OF LATERAL ABERRANT THYROID.*

By MICHAEL G. WOHL, M.D.

Among embryonal tumors of the neck, aberrant thyroids are of most uncommon occurrence and are least often diagnosed by the surgeon. Schraeger (*Surg., Gynec., Obst.*, XII, 1906, p. 465), has collected from the literature sixteen cases, and out of these seven were diagnosed wrong, and in eight no diagnosis was made at all. Since Schraeger's extensive article there have been four more cases reported in literature, likewise with no pre-operative diagnosis.

A point of considerable importance is that, on finding carcinomatous thyroid tissue in the lateral aspect of the neck, one ought to bear in mind the possibility of it being metastatic to the thyroid itself and not primary in an aberrant lateral thyroid. This fact was recently impressed upon us by a case in which a tumor of the neck was found, and, upon excision, proved to be carcinomatous thyroid tissue with a very slight amount of lymphoid tissue. From the location of the tumor and the histological examination of the tissue, the diagnosis of carcinoma of a lateral aberrant thyroid was made. On re-examination, however, the patient was found to have a very adherent indurated and slightly enlarged thyroid gland, probably carcinomatous. Although carcinoma of the thyroid rarely metastasises to lymph nodes, yet the possibility of an early involvement of cervical lymph nodes is a point well worth remembering.

By an aberrant thyroid we understand thyroid tissue that is normal or abnormal, and not connected with the thyroid gland itself, occurring along the path occupied by the gland during its embryonal development. This definition excludes thyroid tissue found in the pleura, (Osler), or in the bones and the abdominal cavity. But, as Murphy (*Jour. Am. Med. Assn.*, Dec. 16, 1905, p. 1856), has tersely expressed it, such tumors must be considered as decidedly metastatic.

Embryology.—The typographical occurrence of aberrant thyroids can be best illustrated by a review of the embryology of the gland. About the time that the first pharyngeal pouch is formed there appears the anlage of the thyroid gland, usually termed the median anlage (*Keible and Mall: Manual of Human Embryology*, II, p. 453).

According to comparative investigations of Verdun, (*Comptes*

*From Pathological Department, Nicholas Senn Hospital, Omaha.

Rendus Soc. de Biol., Thèse, Toulouse, 1897, quoted by Keibel and Mall), it constitutes the only anlage of the thyroid gland. It is generally stated that the thyroid has two more lateral anlages; however, recent studies have failed to furnish conclusive evidence that the two lateral rudiments of the fifth branchial pouch (the lateral thyroid anlage of Woelfler and Born), normally ever become converted into thyroid tissue, (Keibel and Mall, V. II, p. 469).

The epithelium of the median anlage becomes thickened, forms a stalked vesicle and, as the neck of the embryo elongates, it descends through its hollow pedicle. The hollow pedicle constitutes the thyroglossal duct which becomes obliterated except at the base of the tongue, where its site is marked by the foramen caecum. The lower part of the pedicle produces thyroid tissue (Fig. 1).

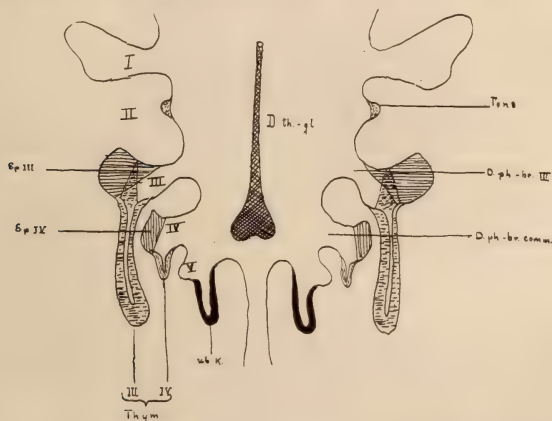


Fig. 1.—(After Keibel and Mall.) D. th.-gl., ductus thyroglossus; Ep., epithelial bodies of third and fourth pouches; ub. k., ultimobranchial body.

Thyroid cells may become dislodged and remain along the duct, giving rise to the median aberrant thyroids, designated superior or inferior according to the location above or below the hyoid bone. Median aberrant thyroids have been extensively considered by Storrs, (*Annals of Surgery*, Sept., 1904), and Murphy, (*loc. cit.*).

When the thyroglossal duct remains patent anywhere along its course it gives rise to formation of cysts which bear close resemblance to dermoids, for which condition they are often mistaken.

Streckeisen, (*Virch. Arch.*, CIII, 1886), and Erdheim, (*Zieg. Beitr. z. Path. Anat. und Allg. Path.*, XXXV, 1904), have discussed these cysts in detail.

The origin of lateral aberrant thyroid is a matter of speculation, since the ability of the lateral anlage to produce thyroid tissue has been refuted. Schraeger (*loc. cit.*), has suggested that they might originate from the parathyroids, normal or supernumerary. We believe this view to be untenable since the parathyroids differ widely, both in their physiology and embryology, from the thyroid. It is true that the parathyroid may at times contain an acidophilous substance resembling colloid. However, its colloidal nature has not been proved definitely, as Erdheim pointed out that any albuminous substance contained within a closed cavity may assume the appearance of colloid.

Schilder, (*Arch. f. Path. Anatomie*, 1911, p. 253), claims to have shown that the ultimo-branchial bodies are capable of producing thyroid tissue under pathological conditions. If this is substantiated by future investigation, then the occurrence of lateral thyroids will be satisfactorily explained upon embryologic grounds. At present, however, the most plausible explanation for their occurrence is that during the fusion of the ultimo-branchial bodies with the median anlage, islands of cells become detached from the lateral portions of the median anlage and remain dormant until later in life, when, for some reason or other, they commence to grow and initiate pathologic processes.

Pathology.—Lateral aberrant thyroids may undergo the same pathologic changes as the thyroid gland itself. However, carcinomatous proliferation of the lateral aberrant thyroid is very rare, there being only five such cases reported in the literature.

CASE REPORT.

History.—The case that came under our observation is as follows: Miss A. Age 19 years. Admitted to the hospital December 11, 1916. Present History. Patient has noticed a small lump on the right side of the neck two years ago. She has had no pain but has noticed the tumor has grown a little lately.

Family History.—Nothing of importance that has any bearing upon her present condition. Physical examination showed a small, hard roundish tumor just beneath the anterior edge of the right sternomastoid muscle on a level with the hyoid cartilage. It was not quite as large as a small bantam egg. Tumor had a cartilage-like feel; it was freely movable from side to side and also up and down. Below the tumor and well beneath the sternomastoid is another small, hard nodule the size of a hazel nut which was not continuous with the first. The thyroid gland was apparently normal.

Operation.—By Dr. R. P. Condon. An incision along the anterior border of right sternomastoid. Beneath the edge of the muscle was a tumor which looked like a lymph node. It was easily shelled out. It was the size of a large pecan. About two centimeters below it, and lying deep under the sternomastoid, was another lymph node-like body about one-fourth the size of the first and attached to it. There were three other small lymph nodes, the size of small peas, and were connected with the one just described. They were of a reddish color and had the gross appearance of a large giant cell sarcoma found in maxillary antrum. They were not in contact with the great ves-

sels of the neck and no other enlargements were noticed. The tumor was removed without drainage. Intensive x-ray treatment was used as a post-operative measure. Patient made an uneventful recovery and at the time of her dismissal from the hospital no evidence of metastasis could be found.



Fig. 2.—Carcinoma of aberrant lateral thyroid. Note position of tumor.



Fig. 3.—Photograph of tumor removed. Note appearance after longitudinal section.

Pathological Report.—The specimen consists of five nodules varying in size from a pecan to a pea. They are encapsulated and interconnected by connective tissue bands. Upon section the larger nodules, (A) and (B), present a gray white appearance, and the smaller nodules are of a more reddish, and

in places, gray color. (Macroscopically the tumor has no resemblance to thyroid tissue.)

Microscopical.—Section from larger two nodules shows follicles filled with an albuminous material which has an orange color with Van Gieson's stain. The follicles are lined with cylindrical cells, which in places fill the lumina of the follicles. In other places there is a papillary formation with invasion of the stroma. The connective tissue stroma is increased in amount and is vascular. Section from the smaller nodules reveals lymphoid structure with nests of epithelial cells which has almost completely replaced the lymphoid tissue. In other places, adeno-carcinomatous formations are seen and the lumina of the gland-like structures are filled with colloid material.

Diagnosis.—Papillary adeno-carcinoma.

CASES IN LITERATURE.

The cases reported since Schraeger's article are appended herewith: *Case 17*; Cushway, (*Annals of Surgery*, 1909, XLIX, p. 55), Mrs. E. Age 26. Patient noticed a small tumor on the left side of neck for the last two and one-half years. No pain nor tenderness. Tumor has not increased in size during menstruation. Tumor was size and shape of goose egg and located on left side of the neck opposite the hyoid bone. Upon removal, tumor was found to be connected by fibrous band with four small bodies of the same structure as the larger one. Microscopical examination showed tissue to be normal thyroid.

Case 18.—Pool, (*Annals of Surgery*, 1910, LII, p. 711). Woman 46 years of age. Three years ago patient noticed a small lump on the left side of neck which gradually increased in size. It was never painful. Last summer she began to have stinging pains of great severity in left shoulder and recently these pains extended to left arm. Patient lost thirty pounds in weight the past year.

Examination.—On left side, corresponding to lower two-thirds of sterno-mastoid muscle, there was a swelling about three and one-half inches in diameter. It was hard and nodular, the skin covering it was movable and normal in appearance. Tumor did not move during deglutition. Microscopical diagnosis revealed papillary adeno-carcinoma of accessory thyroid and extensive metastatic involvement of lymph glands.

Case 19.—Martin, (*Annals of Surgery*, LX, 1914, p. 379). Woman 42 years of age. Patient noticed for the past two years a mass under the sterno-mastoid muscle at the level of the angle of jaw. No pain and no interference with deglutition or respiration. Tumor was the size of a hen's egg and was not attached to the skin nor underlying tissue. Microscopical examination showed it to be thyroid tissue.

Case 20.—Gerster, (*Annals of Surgery*, LX, 1914, p. 380). Woman 60 years of age. Developed subcutaneously, in right supraclavicular region, a movable tumor, which, after remaining stationary for a long time, began growing rapidly and became adherent to the skin with perforation and subsequent ulceration. It apparently had no connection with the thyroid gland. Tumor proved to be carcinoma of accessory thyroid.

Age and Sex.—The respective age and sex of patients with carcinoma of the thyroid gland were: female, 38 (Hinterstoisser), male, 44 (Hinterstoisser), female, 64 (Schraeger), female, 46 (Pool), female, 60 (Gerster). Our case, female, 19, was the youngest case ever recorded. It is interesting to note the preponderance of the female sex over the male as being five to one.

This is still more striking since other disturbances of the thyroid, e. g., myxedema, etc., have been observed more in the female sex, three and one-half to one, (Pineles quoted by Schilder). Of the fifty-four cases of both lateral and median aberrant thyroid collected by Murphy and Schraeger, forty-eight or 88 percent were in women, (Schraeger, p. 473).

Symptoms, Diagnosis and Treatment.—From the few cases reported in the literature it would seem almost impossible to build up a clinical entity from which a preoperative diagnosis could be made.

The pathogenesis of tumors of the neck is varied. However, in the clinical picture they are similar to each other, so the surgeon should bear in mind the possibility of a lateral aberrant thyroid in the differential diagnosis of tumors of the neck, especially if the patient is a female and the tumor has a tendency to fluctuate during menstruation. Before the tumor of the neck is removed the presence of a normal thyroid should be ascertained as the aberrant thyroid may be the only one that the patient has. The final determination of the tumor being an aberrant thyroid is often only possible by a careful microscopical examination of the tissue. If the tumor has been of rapid growth and infiltrates the neighboring tissues, the probability is that carcinomatous changes have set in and the operative treatment should be, as in carcinoma in any other part of the body, irrespective of the presence or absence of the thyroid gland.

I wish to acknowledge my thanks to Dr. F. Kuegle for the preparation of the illustrations.

THE ELEMENTS OF SAFETY IN PROSTATIC SURGERY.

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Men doing urological practice are frequently struck by the *bizarre* views on prostatic surgery held by general practitioners and the general surgeon who occasionally does a prostatectomy. Many of the former look upon a prostatectomy as the most formidable operation in surgery, and attach to it the stigma of a hopelessly high mortality, while some general surgeons perform the operation without a preliminary cystoscopic examination and with but the vaguest ideas of helpful pre-operative and post-operative treatment. Thus it is not unusual to have a patient, to whom removal of the prostate has been recommended, refuse, with the reason that his family doctor has told him that the mortality is so high as to allow no warrant of the hazard of the operation. Recently a general surgeon, describing his experience in prostatic surgery, confessed to a mortality of 46 percent!

The urologist whose mortality in prostatic surgery remains well under 10 percent, and who sees such excellent end results from prostatectomy, cannot but believe, when he hears the above views, that the general medical body is not sufficiently interested in the progress of genito-urinary surgery to keep up with its yearly advances.

The means of keeping down the mortality of prostatic surgery are so clearly defined and productive of such definitely beneficial results, that the surgeon who does not employ them is not keeping the fullest faith with his prostatic patients. Some who are not skilled in cystoscopic technic inveigh against a pre-operative examination of the bladder, advancing the argument that no additional information of importance is gained and that the urethra and prostate are unnecessarily and, at times, dangerously traumatized.

Every case before being prostatectomized should be cystoscoped by a trained and careful cystoscopist. Carefully done, a cystoscopic examination is practically without pain, does not traumatize much more than the passage of a catheter, and enables the intending operator to secure information oftentimes of the utmost importance. Thus, a carcinoma of the bladder wall may be a coincidental factor with an enlarged prostate, but unless an exact cystoscopic examination be made, the more obvious subjective and objective symptoms of the enlarged gland may so overshadow the

signs of the malignant condition as to render them obscure and not easily distinguishable. I have in mind several instances in which prostatectomy was proposed and in which a carcinoma was found upon cystoscopy. Naturally, following this discovery, the idea of prostatectomy was abandoned. It can readily be understood that prostatectomy in the presence of vesical carcinoma is not a warrantable procedure.

Vesical calculi in diverticula might easily escape discovery during the hurry of a prostatectomy, whereas, if their presence be established by a pre-operative cystoscopy, there is no chance of overlooking them at the time of operation.

Or a papillomatous growth might be present in the bladder to be disturbed during the operation and fragments scattered throughout the operative area with the almost inevitable result of secondary growths in the wound due to implantation. A cystoscopic examination by an expert would obviate this unhappy occurrence.

The foregoing citations of possible findings in the bladder should easily nullify the stand of those general surgeons who oppose routine cystoscopic examinations of prostatic patients. Expertly done pre-operative cystoscopic examinations will not add to the distress of the patient, difficulty of the operation, or jeopardize the operative chance, and routinely done will have a considerable influence in reducing prostatectomy mortality in discovering the occasional patient with concomitant bladder pathology, such as mentioned above.

Unless the operator have a cleanly cut conception of the damage done to the kidney function through long continued obstruction, inevitably will he have a higher mortality rate than he ought to have. Furthermore, unless he determine through accurate methods the index of damage done to the urinary function, and take the appropriate steps to remedy this damage before proceeding to the enucleation of the gland, the operator is again derelict in his duty. There are certain correctable secondary factors that influence the mortality of prostatectomy, and no one is justified in doing this character of work without a thorough appreciation of these factors, and an understanding of the best means of meeting them. Modern-day methods for ascertaining the condition of the renal function, probably the most important single factor involved in prostatic mortality, make possible the determination of this function with almost mathematical accuracy and provide one with premises upon which to base fairly satisfactory prognostic conclusions. In prostatic as in all surgery, the element of chance should be reduced to a minimum, and this is possible only through an intelligent application of every diagnostic, preparatory and post-operative measure of proven worth.

It is upon an accurate understanding of pre-operative cystoscopic findings, with determination of the elimination time and intensity of colorimetric tests, and of the urea output and blood nitrogen retention, that the suitability of individual cases for prostatectomy must be based, and no case should be prejudged without them. When it is remembered that the important matter of the choice of an anesthetic is also involved, the need for having a comprehensive knowledge of the renal function becomes all the more urgent.

The elimination time and intensity of color of the dye tests give a good idea of the secretory activity of the kidneys, but if the most comprehensive survey of the renal function is to be made, an accurate determination of the urea output and of the nitrogen retention in the blood must be done. Personally, I place greater dependence upon the latter two procedures than in the phenolsulphonophthalein test, for I have far more faith in their prophetic assistance.

In the vast majority of instances, pre-operative urinary drainage is the essential factor in reducing prostatic mortality. In many cases this can be done so successfully through continuous catheterization that preliminary cystotomy is not necessary, but with the least doubt presenting itself, or with the development of objectionable features attaching to the continuous employment of the catheter, a cystotomy should be done, invariably under local anesthesia. I find for this purpose that a one-half percent solution of novocain is the best. In making this an actually painless operation and reducing shock to a minimum, there are three essentials to be borne in mind: waiting sufficiently long for complete anesthesia, the sharp cutting and not tearing of tissues, and absolute quiet in the operating-room. Loud talking and a display of temper are inimical to the success of work under local anesthesia. Another help to success is to irrigate the bladder thoroughly, and then introduce into it two ounces of a two percent solution of novocain before the patient enters the operating-room. This seems a minor point, but in reality it is one of the utmost importance. The catheter, clamped, is left *in situ* so that the bladder may be well distended when wanted. With the cystotomy done and a drainage tube in place, the pre-operative régime of the prostatic is just begun. Henceforth, the purpose of the treatment is to raise the index of renal efficiency, and this is manifested, of course, by an increase in the urine's specific gravity and the output of urea.

The prostate should not be removed as long as these figures show improvement. When they reach a stationary point it is obvious that a maximum of renal efficiency has been reached, but not until then should the gland be removed. During this pre-operative period large quantities of water must be drunk and the bladder irri-

gated daily through the penis with some antiseptic fluid, preferably silver nitrate. The urine should be rendered acid by acid sodium phosphate or ammonium benzoate. The latter, in 15-grain doses, as pointed out by Thomson-Walker, will render the urine acid more quickly than acid sodium phosphate. On more than one occasion I have changed the reaction of alkaline urine that remained uninfluenced by acid sodium phosphate and phosphoric acid for days, with a few doses of ammonium benzoate. It is, of course, only in an acid urine that hexamethylenamine splits up, and the important purpose of rendering an alkaline urine acid is to enjoy the antiseptic power of hexamethylenamine. Provided no idiosyncrasy for hexamethylenamine exists, a more potent influence will be secured from large doses (20 grains) given every four hours for 24 to 48 hours, as also emphasized by Thomson-Walker, than from the small, usually employed dosage continued over long periods. After this period of large dosage, the quantity of hexamethylenamine may be reduced to 10 grains, which should be enough to maintain a sufficient formaldehyde impregnation of the urine. Repeated tests should be made to determine the acidity of the urine, the ammonium benzoate being repeated as need arises.

If the renal function under preliminary drainage, either through continuous catheterization or suprapubic cystotomy, shows marked improvement ether may be used for the enucleation, but it should be given by an expert anesthetist and not by the most lately joined interne who will invariably manifest more interest in the surgeon's work than his own. Expertly employed and under favorable conditions, local anesthesia in the terminal step of a two-stage prostatectomy is the ideal method, but unfortunately the difficulties attending its use in the gland's enucleation often bring its advisability into question, and gas-oxygen is nearly always preferable, even so is ether. If the renal function has shown pronounced improvement, ether is quite safe and should be the anesthetic chosen.

In post-operative management, an important matter is the method of drainage. A $\frac{7}{8}$ -inch tube, with a lateral eye, is best, and to protect the prevesical space the bladder should be sewn tightly around it. A large sized tube precludes blockage by large coagula. Careful drainage of the prevesical space is also necessary.

Ordinarily if the enucleation has been without great effort hemorrhage is not severe, but in several instances I have had a most alarming hemorrhage even when no difficulties attended the enucleation. In the event hemorrhage is markedly persistent, I pack the cavity with a mass of folded gauze, held tightly in place by means of a tape drawn through the penis. Another tape through the drainage tube permits its removal upon subsidence

of the hemorrhage, or it may be left lying loose in the bladder until the removal of the tube, when it is withdrawn.

I practice daily irrigation of the bladder with a solution of nitrate of silver through the drainage tube, for the purpose of washing out the heavy abnormal constituents (pus, mucus, blood) of the urine which gravitate to the cavity remaining after the gland's removal. The bladder is kept clean and infection guarded against through this measure.

It is only by a rigid adherence to these factors of safety that success in prostatic surgery is attained, and unless the operator is painstaking in his application of every pre- and post-operative detail, and has an intelligent appreciation of its rationâle, his prostatic surgery will not measure up to modern requirements.

TRAUMATIC INJURIES TO THE THORACIC DUCT.

By OLIVER J. FAY, M.D., F.A.C.S., Des Moines.

The annals of surgical history contain but few records of isolated traumatic lesions of the thoracic duct. When Kirchner¹ in 1885 reported a case of traumatic rupture of the thoracic duct, he could find only 11 reported cases of such injury and of these two alone can be definitely classed as of traumatic origin. Zexas² in 1912, i. e., 27 years later, could find record of only 24 non-operative injuries of the thoracic duct, including those taken from the very early literature, most of which are lacking in many of the details essential to make the diagnosis conclusive. By virtue of the rarity of such injuries and the peculiar interest which is therefore attached to them, it is probable that a majority of the recognized cases of isolated injury to the thoracic duct have found their way into the literature, but emphasis must be laid upon the qualifying "isolated." Because of the protected position of the thoracic portion of the duct, and its intimate relation to the jugular vein and the carotids in the cervical portion, in a majority of the cases in which it is traumatized, other and far more serious injuries must also occur, completely masking the symptoms of its injury, or rendering such symptoms as do occur of only secondary importance.

Mechanism of the Injuries, their Site, and Character.—Of the 24 cases collected by Zexas², 18 were due to subcutaneous, 6 to penetrating injuries. He classified the cause of injury as follows:

- 4 cases gunshot wound.
- 2 cases incised wound.
- 6 cases fracture of the ribs or clavicle.
- 1 fracture of a vertebra.
- 3 cases fracture of vertebrae and ribs.
- 7 contrecoup.

Of the two incised wounds, one, inflicted with an ax, severed the cervical portion of the duct, the second, the result of a knife thrust, injured the thoracic portion. The gunshot wounds are also equally divided, two injuring the cervical, two the thoracic portion. Subcutaneous injury of the cervical portion of the duct must be considered a possibility but it is the thoracic portion which is most often injured; injury to the intra-abdominal portion is also possible, but its occurrence as an isolated injury has not been definitely demonstrated at autopsy or operation. The accidents which have resulted in subcutaneous rupture of the thoracic duct have, for the most part, been traffic injuries, or other accidents,

such as earth slide, resulting in violent compression of the thorax. In Kirchner's case,¹ however, the injury was of a most trivial sort, and was given no thought at the time. His patient, a little girl of nine, was shoved against the window sill by a rough playmate; ten days later, when dyspnea, and cyanosis necessitated the summoning of a physician, the incident had been entirely forgotten, and was only recalled after careful questioning.

The mechanism of injuries to the thoracic duct when associated with fractures of the ribs, vertebrae or clavicle does not differ from that of injuries to the pleura, lungs, or other organs by bony fragments, though the injuring of the duct alone does partake somewhat of the nature of a miracle. It is not so easy to explain the mechanism of those injuries attributed to contre-coup. The walls of the thoracic duct are far weaker than are those of the blood vessels or of the esophagus, and in certain cases the rupture appears to be the result of overstretching, as in the case reported by Port², where the upper part of the body was forced suddenly backward while the injured was shouting lustily. The degree of tension within the duct, and within the thoracic cavity may also be factors in determining the injury.

The number of reported cases is so small, and of these so few contain either autopsy or operative reports, that it is impossible to speak of "characteristic" injuries.

It is probable that in most of the cases, the duct is completely severed, but partial ruptures may also occur. In some cases the tardiness with which the symptoms appeared, suggested to the reporter that the perforation was of a secondary nature.

Symptomatology.—Injury to the thoracic duct does not *per se* give rise to striking or characteristic symptoms, and unless the accident has been one of a trivial nature, and that is exceptional, concomitant fractures, or even bruises and ecchymoses will be of dominant interest immediately following the accident. In the cases of a penetrating injury, the escape of chyle from the wound, immediately following the receipt of the wound, or perhaps only after the passage of some hours or days, will become apparent. The escaping fluid may be clear serous, pale yellow, or milk-like, and may either well up in the wound, or escape in a small stream. Again it is said to escape in jets, synchronous with inspiration. In subcutaneous injuries instead of this lymphorrhea, there is the more or less rapid development of chylothorax, in rare instances of abdominal ascites, with resulting dyspnea, and accelerated pulse, but no rise of temperature.

Diagnosis.—In the case of penetrating wounds, the examination of the escaping fluid makes diagnosis easy. In subcutaneous injuries, the development of a pleural effusion, unaccompanied by fever, but associated with a scanty secretion of urine, with hun-

ger and thirst but without symptoms of anemia, may suggest a diagnosis of ruptured thoracic duct, but the diagnosis can only be assured by examination of the aspirated fluid. In 17 of the reported cases of injury to the thoracic duct, chylothorax developed, and in 10 of these cases on the right side, while in 3 additional cases it was bilateral. The close anatomical relationship existing between the thoracic duct and the right pleura makes this preponderance of chylothorax on the right side easy of explanation. It has been assumed by some authors that the chyle escapes into the posterior mediastinum and passes through the endothelial spaces into the pleural cavity, but it would seem far more probable that the chyle finds an easier way of egress through a tear in the pleura, for a simultaneous injury of the right pleura seems probable in a majority, if not in all cases.

The amount of chyle which may escape or be drawn off in these cases is remarkable. In several instances of operative wounds of the thoracic duct, it is recorded that not only the dressings of the wound but the bed as well was constantly saturated in spite of frequent dressings, and in a case reported by Dietze,⁴ 27 litres of chyle were aspirated within a period of 31 days.

Prognosis.—Among early writers, wounds of the thoracic duct were generally considered fatal since it was held that the patient who escaped death from the pressure upon heart and lungs of the escaping chyle, must eventually succumb to malnutrition as a result of the lymphorrhea. The ductus thoracicus, carrying the product of digestion, the chyle, and draining the lymphatics of the entire body with the exception of those of the right side of the head and chest, was said to empty into the internal jugular and left subclavian veins. That the wound in the thin-walled duct, through which chyle, which unlike blood has no tendency to clot, was constantly escaping, should heal was inconceivable, and death was accordingly considered almost inevitable. While our knowledge of the anatomy of the thoracic duct is still far from complete, we have at least learned that so-called abnormalities in the terminal portion of the thoracic duct are so common as to forfeit any claim to abnormality. Wendel⁵ in 17 observations, found that the duct had a single termination in only 9 cases, or little more than 50 percent, that it was double in 3, three-fold in 1, and multiple in 4. Parsons and Sargent⁶ tabulate 40 observations according to the different methods of opening, as follows:

- | | |
|--|----|
| A. Single ducts opening into the lowest centimeter of the internal jugular vein. | 19 |
| B. Single ducts opening into the junction of the internal jugular and subclavian veins. | 3 |
| C. Double ducts joining and opening into the lowest centimeter of the internal jugular vein. | 7 |

D. Double ducts joining and opening more than one centimeter above the junction of the internal jugular and subclavian veins.....	2
E. Double ducts with two openings into the lowest centimeter of the internal jugular vein.....	4
F. Double ducts with two openings; one into the lowest centimeter of the jugular, the other into the same vein higher up.....	1
G. Double ducts with two openings, one into the lowest centimeter of the internal jugular, the other into the subclavian vein.....	2
H. Multiple ducts with four openings, all into the lowest centimeter of the internal jugular vein.....	1
I. Multiple ducts with four openings, one into the lowest centimeter of the internal jugular, the other three into the subclavian.....	1
Total.	40

It is thus seen that in 18, or little less than 50 percent of these cases, the duct is multiple; where the thoracic duct is injured, the chances are, therefore, about even that only one of several branches, and not the only channel has been severed. Moreover, the fact that where the thoracic duct has been ligated, in clinical as well as in experimental work, no symptoms of malnutrition or of other serious derangement have resulted from such ligation, seems to justify the assumption that anastomoses, so lavishly provided in other parts of the body, are not lacking here. Boulard⁷ asserts that the wounds of the thoracic duct are in reality less portentous than the conditions from which they result; that where death does ensue following injury to the thoracic duct, the age and condition of the patient, the shock of the trauma (and in the case of operative wounds, the condition which demanded operation, in most cases tuberculosis or malignancy) rather than the injury itself are responsible for the fatal outcome. In Zesas² compilation of 24 cases of traumatic injury to the duct, death resulted in 12, or in 50 percent. In the very early cases, it is difficult to form any conclusions as to the immediate cause of death (even the diagnosis is often open to question), but the possibility of secondary infection is not to be excluded. In the later cases, exhaustion and asphyxia are usually given as the immediate cause of death. In 49 cases of operative injury to the thoracic duct (Zesas⁸) there were only 5 deaths, a mortality of 10 percent, and even in some of the cases, the injury to the thoracic duct is to be considered the immediate cause of death only in so far as it was "the last straw that broke the camel's back."

While the recorded mortality of 50 percent certainly justifies the classification of traumatic lesions of the thoracic duct as grave injuries, the relatively low mortality in operative injuries, and in experimental work on the thoracic duct seems to warrant a brighter prognosis for these injuries in the future.

Treatment.—The treatment of penetrating wounds of the thoracic duct, usually involving the cervical portion, is, in a general

way that given injuries inflicted during operation. Five procedures have been employed:

1. Suture of the severed duct, or of the wound in its walls.
2. Implantation of the severed duct in a vein (*jugularis*).
3. Ligation of the duct.
4. Tamponade of the wound.
5. Acupressure (*Umstechung*).

Suture.—The restoration of the integrity of the thoracic duct by suture of the wound in its walls or of the severed ends, with the resulting re-establishment of normal conditions is the ideal treatment for such injuries. While the walls of the duct are thin, its size (often given as that of a goose quill), would seem to make the employment of a Carrel suture entirely feasible. In at least five instances, wounds of varying severity have been successfully sutured. The weakening loss of chyle is prevented, the establishment of a fistula guarded against, convalescence is shortened. The condition of the patient might, however, make it inadvisable to take the time necessary for such a procedure.

Implantation.—The implantation of the severed thoracic duct into a vein (the internal jugular), which has been freed, ligated, and severed, was first suggested by Schopf⁹ in 1901 as a procedure which was of theoretical interest, but presented too great technical difficulties to be of practical value. Two years later, however, Deanesley¹⁰ was successful in implanting the end of the severed thoracic duct into the internal jugular vein, after the latter had been ligated because of simultaneous operative injury. The term "successful" as applied to this case is to be considered only as referring to the immediate result of implantation since the entrance of blood into the thoracic duct would result in thrombosis. Schopf's judgment as to the practicability of the procedure may, therefore, still stand.

Ligation.—The ligation of the duct, or where this procedure meets with difficulties, its closure by means of forceps, has the virtue of being rapidly accomplished, of immediately checking the escape of chyle, and neither the clinical nor the experimental work thus far done has demonstrated any bad effect upon the general health as the result of such ligation, thanks to the rapid development of a collateral circulation. In all of the 13 cases in which this procedure has been employed, it has met with success, though in 4 cases lymphorrhea persisted for a time. It is the procedure of choice in all cases in which suture of the duct is impracticable.

Tamponing.—Tamponade of the wound has been the most frequently chosen procedure, though its preference is not easily justified from a theoretical standpoint, nor on the basis of clinical evidence. Though small wounds may be closed by coagula (Boege-

hold¹¹), the compression of the main trunk of the duct is necessary to the development of a collateral circulation, and such compression cannot be secured by tamponing the wound in the neck. In 4 of the 21 cases in which tamponing was resorted to, it met with immediate success, but in 14 there was a persistent escape of chyle. The three remaining cases terminated fatally. And in the four successful cases, it is possible that the wound was a small one capable of spontaneous healing. In one of my own cases during a difficult dissection of tuberculous cervical glands, the thoracic duct was injured, as evidenced by the free flow of chyle. At that time I shared the general belief in the extreme gravity of such injuries; simple tamponing of the wound controlled the flow of chyle, however, and the wound healed as readily and as uneventfully as if there had been no such unpleasant incident—evidence, I think, that the thoracic duct had been incised only, and not severed. As an emergency measure, particularly in those cases in which the patient's condition prevents the prolonged search for a wound not readily located, its value must be granted. In a case reported by Dobbertin¹² in which all other measures of controlling the lymphorrhoea had failed, the wound was tightly packed with walnut-sized cotton tampons enclosed in gauze, and the fasciae then closed by continuous suture with catgut, the skin by continuous suture with silk. The escape of lymph ceased at once, and ten days later the buried tampons were removed through a small opening made in the lower angle of the wound.

Acupressure.—While acupressure (*Umstechung*) has been successfully employed to control the lymphorrhoea in at least one case, and in a second its employment, though without effect was entirely innocuous, the close proximity of large blood vessels renders the procedure not only uncertain but also unsafe.

CONCLUSIONS.

To summarize, suture of the thoracic duct is the procedure of choice whenever it can be performed. Where suture is impossible, the duct should be ligated, or forceps applied. Where neither of these procedures can be successfully carried out, because of the general condition of the patient or the difficulty encountered in locating the injury to the duct, the wound should be firmly tamponed.

In the treatment of injuries to the thoracic duct within the thorax, the exposure and suture or ligation of the duct is impracticable; conservative treatment is a matter not of choice but of necessity. The first aspiration usually precedes diagnosis, whether it be undertaken purely for diagnostic purposes, or for the relief of dyspnea and other distressing symptoms of an intra-thoracic effusion. Repeated aspirations are necessary whenever this increased pressure threatens life, but only then, for following as-

piration the fluid is usually replaced with great rapidity, the negative pressure within the thorax favoring its escape, and the body is thus deprived of an economically valuable fluid, capable of being absorbed, without any compensating mechanical relief. It may also be assumed that the pressure exerted by the escaped fluid upon the thoracic duct serves in some measure as a tampon, thus favoring the development of a collateral circulation below the point of injury. In order to avoid the negative pressure within the thorax which results from aspiration, a thoracotomy with the resection of one or more ribs may be employed should mechanical relief become necessary following the initial aspiration and the resulting diagnosis of injury to the thoracic duct.

The loss of chyle to the system soon makes itself apparent in the rapid fall in strength and weight, and the patient's strength must be maintained by generous feeding.

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ARTIFICIAL PNEUMOTHORAX THERAPY OF PULMONARY TUBERCULOSIS.

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In 1882 an Italian, Forlanini, having observed that certain cases of pulmonary tuberculosis that developed a spontaneous pneumothorax seemed to be benefited by the accident, suggested that a pneumothorax be induced artificially for the purpose of securing a certain amount of rest of the affected lung and giving it a chance to heal. Ever since that time one finds occasional references to this operation in medical literature, but only recently has the operation attained any degree of popularity. Almost all of the articles on this subject have been written by sanatorium physicians and in perusing them one gets the impression that the operation is not feasible in private practice. During the past two years I have used artificial pneumothorax in five advanced cases of tuberculosis. In three the results were so gratifying that I am under the impression that a discussion of this operation might be interesting and profitable. All of the cases were progressive and had resisted treatment by the usual methods, viz., fresh air, forced feeding, rest, and tuberculin. Four of the cases were treated in an ambulant way, three lived in St. Charles and one in Valley Park, and came to the hospital (18 to 20 miles) in the morning, received their treatment usually at about 11 a. m., and returned to their homes as a rule in the evening. I regret that no x-ray pictures were obtained but as these patients were all of very limited means it was not thought best to subject them to this expense. I have used atmospheric air in almost all of my injections, partly because of its convenience and partly because it is almost impossible to buy pure nitrogen gas. Besides Webb, Gilbert, James and Haven (*Archives of Internal Medicine*, December, 1914), have compared a series of patients treated by 99 percent N. and by atmospheric air, withdrawing the gas from the chest before the next injection, and found that the gas obtained from the pleura was practically identical, whether nitrogen, oxygen, or atmospheric air had been used, viz.: oxygen, 1.5-8 percent; carbon dioxide, 6.2 percent; and nitrogen, 85-90 percent. Recently Tachau and Thilenius (*Zeitschrift für klin. Med.*, band 22, heft 3, 4) have published a series of analyses of gas obtained from the pleurae of cases of induced pneumothorax (nitrogen having been injected) and found almost identical results. These authors suggest that it might be well to inject a mixture of nitrogen, oxygen, and carbon dioxide

similar to what one finds in the pleura after an artificial pneumothorax, as this mixture might prove less irritating.

I have injected rather large amounts of gas, usually 500-600 cc. at the first injection and from 500 to 2000 cc. at later injections, being guided by the patient's feeling of "tightness" and by observations of the manometer, a positive pressure of 1-2 cm. not having been exceeded. Injections were given at first once a week, later every 2, 3 or 4 weeks as seemed necessary. I do not think that this is the ideal way of using pneumothorax, smaller injections at more frequent intervals being preferable, but feel that it was the best that could be done with the class of patients I had under observation.

I have given 97 injections to these five patients without serious mishap. There have been no exudates, although I suppose this is more a matter of luck than anything else. I have not found it necessary to use the open method of Brauer in any case and am not sure that I would advise it if I found it impossible to get into the pleural cavity by the puncture method of Forlanini.

CASE I.

Mrs. B., married woman of 25 years, came under my observation on March 1, 1915. Physical examination showed dullness and râles over the left apex and a three months' pregnancy. Tubercle bacilli were present in sputum. She was treated in the usual manner and did fairly well up to her confinement on September 1, 1915, after which she became rapidly worse. On November 23 I injected 800 c.c. of air into the pleura and repeated this operation eleven times during the next seven months (from November 23, 1915, to June 19, 1916). On February 9, 1916, she had a violent coughing spell while being compressed and spat up several bloody sputa but the bleeding ceased spontaneously in a few minutes; the other injections were uneventful, but the patient did not receive any benefit from them, became progressively worse and died on November 8, 1916, in spite of the treatment.

CASE II.

Miss R., unmarried woman of 41, came under observation on February 16, 1914, after having been 18 months at the State Sanatorium at Mt. Vernon. Examination showed an extensive tuberculosis of the left lung and larynx and a moderately advanced tuberculosis of the right lung. I treated her in the usual way, including tuberculin from February 16, 1914, to December 2, 1914, without any special improvement. On December 2, 1914, I injected 400 c.c. of nitrogen and have been injecting air at intervals of 2 weeks to 3 months ever since that time, viz., 2 years and 3½ months. I have given her twenty-eight injections without mishap except a novocain intoxication on February 13, 1915, which was not serious, and a subcutaneous emphysema on one occasion which followed an injection. Dr. Sauer treated the larynx successfully, but the lung has grown slowly worse, so that the left lung is pretty generally involved at present while the right is still in fair shape. The patient, however, coughs and expectorates but little, the temperature does not exceed 99.5° F. at any time now and she has held her weight since this first treatment. I do not think that the pneumothorax has been of any great benefit to this patient, although it is only fair to state that she interrupted treatments for three

months on two occasions, and that her case was by no means an ideal one for the treatment. She is still under treatment.

CASE III.

Miss K., unmarried woman of 37, came under observation on August 6, 1913. The right foot had been amputated in 1909 on account of a tubercular ankle joint. She had been coughing for a year, had lost much in weight and had moderate fever. Physical examination showed dullness and râles over the right apex. Many tubercle bacilli were found in the sputum. She was treated in the usual way including tuberculin and did very well, gaining 25½ lbs. during the first year. After being under treatment for a year, however, she began to grow worse, fever set in, she lost in weight, sputum increased and gradually a cavity developed in the right apex. She weighed 98½ lbs. on August 6, 1913. After being treated for one year in the usual way her weight had gone up to 124, but eight months later the weight had gone down to 111 lbs. The case seemed progressive and rather hopeless, therefore I persuaded her to let me compress the right lung which I did for the first time on May 8, 1915. I have been repeating the injections every 2 or 3 weeks since that time (22 months), giving her thirty-one injections without any complications whatever. She improved almost from the first compression, the sputum diminished, the fever gradually disappeared and she picked up in weight so that at present she weighs 128½ pounds, feels well but still coughs a little and spits up some on arising. She has had tuberculin off and on also. I am under the impression that the artificial pneumothorax was of the very greatest aid to her, and, while it is true that she has not fully recovered, I believe the disease is in a fair way to be arrested.

CASE IV.

Miss P., a girl 19 years of age, came under observation on April 21, 1915. She had been ailing for six months. Physical examination showed dullness and râles over the left apex. I treated her in the usual way for 3½ months during which time she had fever up to 101° or 102° F., at times as high as 103° F. almost daily; appetite was poor and the bowels were loose, and the dullness and râles extended more and more. The case seemed progressive. I therefore compressed the left lung on August 6, 1915. The temperature dropped to 99½° F. after the first compression, the next, ten days later, brought it down to normal and her cough and expectoration, which had been quite profuse before resorting to this treatment, ceased almost entirely. I administered twenty injections from August 6, 1915, to October 26, 1916, without mishap, although she had one or two fainting spells after the injections. During this time she continued to improve. She discontinued treatment October 26, 1916, and took a position in a bank in St. Charles, and, in a recent letter, she says she never felt better in her life and has not coughed at all last winter. In this case I feel convinced that the treatment was eminently beneficial, if not actually life saving.

CASE V.

Miss F., an unmarried lady of 36, came under observation on March 25, 1914, on account of enteroptosis and neurasthenia. Her nutrition was below par and she had all sorts of dyspeptic symptoms. Under treatment these improved and she disappeared from observation until July, 1916, at which time she consulted me for recurrent attacks of fever, and on examination a little dullness and an occasional râle were found over the right apex, tubercle bacilli were found in the sputum. The usual treatment was instituted but the patient was rebellious, her stomach was bad and she would not follow

directions so that treatment was most unsatisfactory. This state of things continued up to the early part of December, 1916, when she began to have high fever, chills and sweats, and the process in the right lung advanced rapidly; the left lung became involved almost at the same time although only slightly. She lost ground very rapidly. Dr. Albert Taussig saw her with me and agreed that artificial pneumothorax should be given a trial. I injected 500 c.c. of air on December 28, 1916, most of which leaked out giving her a subcutaneous emphysema, which, however, did no special harm. On January 26, 1917, I injected 750 c.c., which brought the temperature down to 102° F., and the next injection brought it down to almost normal, where it had remained ever since. She has picked up in weight, appetite is excellent, coughs very seldom, has almost no expectoration and she seems now in a fair way to recovery. I have given her seven treatments to date.

In conclusion I wish to emphasize that all of these cases are so recent that I do not consider any of them as fully recovered, but I do feel that the pneumothorax has been of very great benefit to the three last cases, and I cannot get away from the thought that a measure, which is of such unquestioned worth in advanced tuberculosis, ought to be equally useful in the early cases. It has always been urged that the incipient cases recover without this mode of treatment and that therefore it should only be used in progressive cases. Most of us do not use this line of reasoning when confronted with an early case of appendicitis, over 90 per cent of which will recover without operation and perhaps later some of us may be converted to the early use of pneumothorax in cases of pulmonary tuberculosis.

THE TREATMENT OF SEPTIC ABORTION.

By WM. EDGAR DARNALL, A.M., M.D., F.A.C.S., Atlantic City, N. J.

Abortion is undoubtedly one of the oldest incidents known to the practice of medicine, reaching as far back as the history of man. After all these centuries one would naturally suppose that its management ought to be as definitely settled as anything could be. Yet even in this modern day we find the profession divided as to treatment. One group maintains the very active treatment by immediate curettement and another, headed by Winter of Königsburg, holds out for a strictly expectant attitude.

Winter arrived at the conclusion that every abortion with fever should have a bacteriological examination of the discharges from the uterus. If hemolytic streptococci were found the expectant plan should be adopted until the temperature became normal and then the uterus should be emptied of its contents. The profession, however, has not generally adopted Winter's idea. One cannot feel that any reliable criteria as to the indications for treatment can be based upon the presence of any particular bacteria in the uterine discharges or the blood, since nearly every form of bacteria may be found. The microscope cannot furnish us the indication for treatment. Only the clinical findings can. If we wait for the finding of bacteria in the blood to determine what to do we often allow the opportune moment for saving a life to slip by. When bacteria can be demonstrated then the infection has changed from a local one to a general systemic infection. Our experience has shown that blood cultures show no bacteria in the blood in many cases until the end is almost here and, in quite a large number, not even then.

Vineberg is authority for the observation that spontaneous miscarriage is not often associated with fever, but that the presence of fever is the best indication that some interference has been attempted.

In the writer's service at the Atlantic City Hospital there have been 466 cases. Two hundred and thirty-seven of these manifested some rise of temperature ranging from 100 degrees to 107.6 degrees F. Thirty of these latter showed most severe infection associated with severe and repeated chills, high temperature, great prostration and delirium. These were of the virulent streptococcic type. The mortality in such cases is always high. Eight of the 30 died in spite of all our efforts. All of the 30 admitted that various things had been passed into the uterus to bring on abortion and

usually with no efforts at cleanliness. When one considers that in 466 cases there were 8 deaths the mortality is very low for abortion, taking all cases admitted. If the 8 deaths are figured against the 237 cases showing some degree of fever it is but 3.3 percent, but if calculated on the basis of the 30 very severe cases, and they were the only ones in which death occurred, then we have to face a mortality of nearly 25 percent. The natural inference then is that the prognosis depends upon the type of abortion. The clean cases get well if aseptically handled. Those cases of mild degrees of infection by more or less nonvirulent bacteria also show good results, but the streptococcic severe infections quickly pass from a local infection to a general systemic septic condition and overwhelm the patient. Often several days have gone by before the case is sent to a hospital, and in such circumstances, they prove rapidly fatal, under any form of treatment.

What shall be our course of action in the presence of an abortion? Unless we can feel that the uterus is empty we curette them all, at once. In the end, I believe this is the safest plan. The mortality, the morbidity from subinvolution and prolonged bleeding, and the complications in the appendages are much lessened. In a certain number of cases the membranes, placenta and all, are passed intact, but one is never certain of this unless the product can be personally inspected. If the uterus is well contracted down, the os uteri tight, and the bleeding ceasing, usually the uterus is empty. Nothing but harm then can be done by subjecting an empty septic uterus to any form of active instrumentation.

This happy state of affairs is not the rule but rather the exception. Small pieces of placenta are nearly always adherent to the endometrium. If they do not cause infection they prevent involution and often bleeding until the patient may be actually exsanguinated. I recently operated upon a case of this kind in which the blood had been reduced to a point with haemoglobin less than 20 percent and reds 1,200,000. This was all brought about by a small piece of placenta firmly fastened to the posterior wall of the uterus. When this was removed, the patient stopped bleeding and got well.

The usual routine in our clinic, if pregnancy is more than three months and the infection not of a virulent type, is to do vaginal caesarian section using the gloved finger to remove the products of conception. If three months or under, the cervix is rapidly dilated and the contents of the uterus gently removed with small placenta forceps. This may be supplemented by gentle curettage with a broad base curette, such as that used by B. C. Hirst, which does not cut, but does scrape off the tissue from the uterine cavity.

There is no fear in using the sharp curette when most of the mass of the tissue has been removed if it is used with skill and gentleness. When one has developed that fine sense of touch to a degree

that makes him fit to undertake a curettement at all, then the sharp curette in his hands will do less harm than would the dull curette in rough hands, by mauling and bruising the tissues. Curettement properly done calls for more tactile skill and more education in the *tactus eruditus* than any other operation in gynecology. The curette has been so much abused in rough and unskilled hands and so much damage done by it that one wonders sometimes, if the true story of morbidity could be related, whether woman has profited more by its invention or suffered more by its abuse.

Sudden relaxation of the uterus sometimes takes place while curettement is being done. The uterus balloons out to two or three times the size it was and the curette suddenly seems lost with much the same feeling as if the uterus had been punctured. We have observed this a number of times and have demonstrated that there was no puncture, the relaxation taking place as we believe under the influence of the anesthetic. It occurs more often with chloroform anesthesia than with ether, and might fittingly be termed "acute dilatation of the uterus."

If the cervix is fully dilated, soft gauze wound about a pair of dressing forceps or the finger furnishes an admirable method of freeing the cavity of the uterus of its contents without doing harm, thus making unnecessary the use of hard steel instruments and creating less trauma. The uterus is then thoroughly swabbed out with equal parts of carbolic acid and tincture of iodine, the excess being taken up with alcohol. A small strip of iodoform gauze is then passed to the fundus and left in for drainage for 24 hours. Tight packing is only resorted to if hemorrhage is excessive and the uterus very flabby. It gives it something to contract on.

With this method the temperature usually drops to normal by the following day, except in the very severe infections which have spread to tissues beyond the uterus itself, involving the pelvic cellular structures, or veins (thrombophlebitis). If these very severe streptococcic cases can be seen quite early, some of them can be saved by a vigorous injection of antistreptococcic serum in the very beginning, but not all.

We have felt that one of the most important factors in producing the good results we have obtained in septic abortions has been the careful preparation of the vulva and vagina. The vulva is invariably shaved, it and the vagina thoroughly scrubbed with green soap, washed with sterile water, followed by bichloride scrub, and finished with alcohol. This preparation should be as painstakingly carried out as if the abdomen were to be entered or extensive vulvo-vaginal operations were to be done.

SPECIAL ARTICLES.

WHAT THE AMERICAN SOLDIER NOW FIGHTING IN FRANCE SHOULD KNOW ABOUT TUBERCULOSIS.*

By S. ADOLPHUS KNOPF, M. D., New York and Paris.

Captain M. R. C., U. S. Army; Professor of Medicine, Department of Phthisiotherapy at the Post-Graduate Medical School and Hospital; Senior Visiting Physician to the Health Department's Riverside Hospital-Sanatorium for the Consumptive Poor of the City of New York.

Ever since the publication of Professor Hermann M. Biggs' remarkable article, "Tuberculosis in France," in *The Survey* of May 5, 1917, I have been the recipient of many letters and personal visits from parents and friends of our boys who have gone to France to fight for the liberty and democracy of the world. I have been asked again and again what can be done for our boys so that they may not contract tuberculosis while fighting in France. In the number of *The Survey* just mentioned, Dr. Biggs made the following authoritative statement: "In the beginning of this year it was estimated that about 150,000 French soldiers had been returned to their homes with active tuberculous disease and that more are constantly being discharged for this cause." Besides these 150,000 Dr. Biggs conservatively estimated that there would be altogether, including the civilian population, not far from 500,000 cases of tuberculosis in France to be dealt with if the war were to terminate at once. This was in January, 1917.

That such statements as these should cause serious anxiety to parents whose sons are now in France or are about to leave for that country, is easily understood. Yet these parents as well as their brave boys should know that the danger of the latter becoming tuberculous is not nearly as great as one might think from the figures quoted.

There was a time in our own country when the frequency of tuberculosis and the death rate therefrom were as high as it is now said to be in France. It was knowledge of the origin of the disease on the one hand and the methods of cure of the disease on the other, which have resulted in a remarkable decrease of tuberculosis throughout the United States. Popular anti-tuberculosis education under the leadership of Dr. Biggs, and the sanatorium movement under the guidance and inspiration of the late Dr. Trudeau, have made the United States rank next to England, the country which has the lowest tuberculosis morbidity and mortality of any of the great countries of the world.

To summarize in as precise and practical a way as possible the ordinary precautions and the measures which have helped in the fight against tuberculosis in the United States, as they may be applicable to the lives of our boys in the field and trenches in France, is the object of this little essay. It is my hope that thereby not only may the anxiety of American fathers, mothers, and wives be allayed but that by the example given to their brave

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French comrades in the methods of living even in trenches, dug-outs, tents, or barracks, or when billeted in the homes of French civilians, our own soldiers may be effective not only in fighting for liberty and democracy, but also in fighting that other great enemy of mankind, known as consumption. Let our American soldiers in the field and also our French brethren in arms know as much as possible about tuberculosis, its causes and prevention, and they will be able to fight this insidious and invisible enemy as victoriously as they are fighting the visible powers which brought upon the world this indescribable catastrophe.

To make this little essay as practical as possible, I will arrange the subject matter in the form of questions and answers.

What is tuberculosis, particularly the most common type known as pulmonary tuberculosis, or consumption?

It is the most prevalent of all diseases and is chronic, infectious, communicable, preventable, and curable. All these terms are self-explanatory, except perhaps the word communicable, which I prefer to the word "contagious." To illustrate the difference between the words "communicable" and "contagious," let us take the two diseases, smallpox and consumption as examples. Smallpox is a highly contagious disease, the word contagious coming from the Latin *contingere*, to touch. No matter how clean or conscientious the smallpox patient may be, no matter how well conducted the smallpox hospital, it is most dangerous to touch the smallpox patient, and it is most unsafe to visit a smallpox hospital unless you have been vaccinated or revaccinated recently. On the other hand, the honest and conscientious tuberculous patient, who takes care of his expectoration in the manner which will be described later on, can be associated with and touched without any danger of contracting the disease. The sanatorium or tuberculosis hospital, where all precautions concerning the proper disposal of infectious spittle or expectoration are religiously observed and the patients taught to be conscientious, is the safest place not to contract consumption.

What is the direct cause of tuberculosis?

The direct cause of tuberculosis, or consumption, is always the bacillus of tuberculosis, which is a microscopic organism found in the affected part of the body. Pulmonary tuberculosis, or tuberculosis of the lung, is the type of tuberculosis most frequently found, and the type with which those brave French soldiers are now so frequently afflicted; but all other organs of the body (bones, intestines, etc.), can become affected by tuberculosis.

Tuberculous disease is locally characterized by countless tubercles, that is to say, small, rounded bodies, visible to the naked eye. The bacilli, lodged in these tubercles of which they cause the formation are parasites belonging to the lowest scale of vegetable life and must be considered as the specific cause of all tuberculous diseases. This parasite, so small that it can only be seen with the aid of a powerful microscope, not only gradually destroys the lung substance through ulcerative processes, but at the same time gives off certain poisonous substances called toxins which cause various, and often serious, symptoms. In the secretions or expectorations coming from an affected lung, millions of bacilli can often be found.

What are the early symptoms of pulmonary tuberculosis which can be recognized by the layman?

The important earlier symptoms of pulmonary tuberculosis are long-continued cough with or without expectoration or hoarseness, loss of flesh, flushes or pallor in the face, feverish sensation in the afternoon, occasional night-sweats, chilly sensation in the morning, loss of appetite, sometimes a little streak of blood in the expectoration, loss of strength manifesting itself in

easy tiring, frequent colds, a perceptible quickening of heartbeats after slight exertion, a little change in disposition such as an increased irritability, or a feeling of depression.

What are the methods whereby tuberculosis is communicated from one human being to another, or from animal to man?

The three methods by which the germ may enter the human system are by inhalation, ingestion, and inoculation. The tuberculous sputum, when dried and pulverized and mingled with the dust of the air, may be inhaled. Tuberculous meat or milk taken as food is prone to produce tuberculosis, par-



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.

Fig. 1.—Metal floor cuspidor with large opening; should be partly filled with wet sawdust; cover worked by the foot. Fig. 2.—The metal floor cuspidor when closed. Fig. 3.—Nickel-plated oval-shaped pocket flask, manageable with one hand; funnel removable. Fig. 4.—Pasteboard sputum cup, small size. Fig. 5.—Pasteboard sputum purse.

ticularly in children. Inoculation may take place when an open wound or abrasion of the skin comes in contact with tuberculous substance.

How can these methods be prevented or the germs destroyed?

The main method of contracting tuberculosis is by inhalation. Whoever coughs and expectorates, whether it be in the trenches, dug-outs, barracks, armories, or other confined places, should endeavor not to deposit the sputum where it has a chance to dry up, unless it can be where exposure to direct sunlight will render it harmless. When one coughs let him always hold his hand before his mouth. He will thereby avoid inhalation-infection and also spray—or droplet-infection if he should happen to be afflicted with tuberculosis, influenza, or even an ordinary cold. By droplet infection is under-

stood that manner of conveying the disease by the spray of small particles (droplets) of infectious saliva during the so-called dry cough or when sneezing, and in some individuals during excited speaking.

Of course, it is out of the question to speak of the use of spittoons placed on the floor (Figs. 1 and 2), pocket spittoons (Figs. 3, 4, and 5), or even pieces of cloth to be used for expectoration in the trenches, dug-outs, or similar places; but when in ordinary places of human habitation, barracks, tents, armories, or houses of civilians, even if one expectorates only because of a simple cold, influenza, measles, or whooping-cough, he should never do so on the floor or anywhere but in some kind of receptacle where he is sure that the contents cannot dry and become pulverized. Whenever a receptacle is used it should be covered so that flies cannot have access to it and thus carry the germs of the disease on to food or whatever they may alight on. Spittoons should be either poured into the water-closet or rendered harmless by some antiseptic fluid (5 percent carbolic acid solution); pieces of cloth used to receive sputum should be burned and paper spitcups with their contents should be disposed of in the same way, for it must be remembered that even the germs of ordinary colds may prove quite serious, particularly when inhaled by one whose general health has been undermined by fatigue, privation of sleep, want of food, etc. These precautions with the expectoration should be especially adhered to when the soldiers, after leaving the trenches temporarily or permanently, are billeted in peasants' houses in villages, or citizens' homes in towns or cities.

Against the danger of tuberculous food in the form of infected milk or meat, sterilizing or boiling the milk and thoroughly cooking or broiling the meat, suffice for all practical purposes. To protect oneself against getting tuberculous inoculation from any skin wound or scratch, it is best to let the wound bleed freely, so as to wash away infectious substances, and then use a clean piece of cheesecloth or muslin, steeped in hot water or alcohol, and tie up the wound until surgical aid can be obtained.

What protects the healthy individual against contracting tuberculosis?

It should be known to all those who fear to contract tuberculosis because they have been in contact with a tuberculous patient and believe they have inhaled some bacilli, that a healthy individual need not fear to become tuberculous unless he is constantly exposed to the inhalation of the germs. In health, when the human system is in good condition, it is provided with many means of defense against the accidental inhalation of bacilli. First of all, there is the mucous membrane of the nose the secretions of which have what is known as bactericidal, that is to say, germ-killing properties. In the nose a fine growth of hair offers a hindrance to the entrance of coarser particles of dust, while the throat is lined with very fine hair-like bodies known as cilia which by an upward waving motion prevent the finer dust particles and germs from entering the deeper respiratory tract. Lastly, in the blood itself, the white blood corpuscles are active in destroying the bacteria. Similar powers are also ascribed to the secretions of the stomach. Besides these four sources of defense, there exist probably in most of us in our circulatory system what is known as antibodies, which likewise counteract the invasion of tuberculous germs. Thus, any one possessing average good health need not be afraid of becoming tuberculous, even though he may from time to time come in contact with a patient who is not over careful.

In order for tuberculosis to be contracted from the occasional inhalation of tuberculous germs or even the ingestion of tuberculous food, there must exist the conditions in which the tuberculous germs can grow; in other words, the subject must be predisposed either by heredity or acquisition. This predisposition may be accounted for by the subject never having possessed

or having lost the power of natural resistance to the germs. When an individual has never been robust and has never possessed the power of natural resistance to tuberculosis, he has probably inherited this predisposition.

What constitutes an hereditary predisposition to tuberculosis?

A tuberculous parent, particularly a tuberculous mother, when she has been actively ill with the disease during the time of pregnancy, may transmit to the child such a weakened system that it becomes a ready prey to tuberculosis. If the mother is careless she is sure to infect the child after birth, and because of this early after-birth or postnatal infection, tuberculosis is often considered hereditary.

However, for the comfort of those who may have a tuberculous parent let me say here that by reason of the good care bestowed upon him, many such a child has grown up strong and well, and if he has not had tuberculosis by the time he has reached military age, and the disease has not been discovered by the recruiting surgeon, he may safely consider himself free from danger of developing tuberculosis if he leads what might be simply called a normal, healthy life.

Aside from this hereditary condition, there are, of course, many ways in which a predisposition or loss of natural resistance, producing the ready soil for the growth of the tubercle bacillus, may be acquired.

How is the predisposition to tuberculosis acquired?

First of all, there are certain diseases which often leave the system in a weakened condition; among them are measles, whooping-cough, typhus and typhoid fever, grippe, chronic bronchitis, pleurisy, pneumonia, also all venereal diseases. Privation, want of food, lack of air and sunlight, insufficient clothing, and the prolonged inhalation of irritating substances, as well as over-fatigue and lack of sleep, may also render the system susceptible to tuberculosis. Excessive smoking, especially of cigarettes when the smoke is inhaled, is apt to injure the respiratory system and make it more susceptible to disease, to weaken the action of the heart, impair the function of the nervous system, and lessen the general efficiency. One who has never smoked would better not acquire the habit. One of the greatest predisposing causes to tuberculosis is the excessive use and abuse of alcoholic drink. When the alcoholic contracts tuberculosis, the outlook for a cure is not nearly as favorable as in a man of temperate habits. Patients recovering from the above mentioned diseases should be particularly careful to avoid prolonged contact with tuberculous individuals.

What can the soldier in the field do to prevent becoming predisposed to tuberculosis?

Since one of the greatest predisposing causes to tuberculosis is alcohol, it is of course best for the soldier to abstain entirely from the use of liquor and strong alcoholic drinks. As far as possible, he should eat regularly, keep his body clean, and rest when he can so as to avoid over-fatigue. He should keep his bowels in good condition and drink plenty of good, pure water. He should also try to clean his teeth after meals whenever this is feasible. When his garments have become wet from rain or snow, he should not lie down and sleep in them if this can possibly be avoided, and he should be equally careful not to lie down on the moist ground without sufficient protection. But, of course, on the firing line and in trenches and dug-outs these precautions cannot often be carried out and one must do the best he can.

If the air in the dug-outs and trenches seems to be vitiated, that is to say, foul and lacking oxygen, whenever circumstances will permit it the soldier should go where the air is pure and take some deep breathing exercises. The simplest one of all is to inhale deeply, raising the shoulders during the act of inhalation, moving them backward and remaining in that position, re-

taining the air for about 5 or 6 seconds, then exhale a trifle more quickly by moving the shoulders forward and downward. The accompanying illustration (Fig. 6) will help to explain this exercise. Repeat this exercise 6 to 8 times and, if convenient, repeat it after half an hour or an hour.

If the dug-outs and trenches can be ventilated to admit fresh air, this should by all means be done. In tents and barracks and all other sleeping quarters the soldier should, of course, make it his business to see that those habitations are always well ventilated. Fresh air by day and by night is the best preventive as well as curative agent against tuberculosis.

What should the soldier do so as not to spread tuberculosis?

The first symptoms of tuberculosis have been previously described. With these he should make himself familiar, and if he coughs and expectorates he should gather a specimen of his sputum and take it to the doctor for examination. Until he has seen the doctor he should use all the precautions possible, that is to say, spit in a piece of cloth or in a receptacle which he should



Fig. 6.—Breathing exercise with rolling of shoulders.

empty into the trench latrine, water-closet, or drain. During the cough he should hold the hand before the mouth and should never swallow his expectoration.

If the soldier perceives any of the symptoms described, he need not think at once that he has tuberculosis, but it is his duty as a soldier to report his condition immediately to the surgeon in charge of his company. He will then be carefully examined and proper care will be taken of him. If the ailment is not tuberculosis, the examination will demonstrate it; if it is tuberculosis, the early diagnosis and timely treatment will save the individual's life: for let it be known right here that, of all the chronic diseases human flesh is heir to, none offers so favorable a chance for cure as does pulmonary tuberculosis if discovered early.

Should the American soldier in France greatly fear contracting tuberculosis after what has been said of the frequency of the disease among French soldiers and the French civilian population?

First of all, let us consider that even before the war the deathrate from tuberculosis in France was twice as high as, for example, in New York City, that is to say, while in France there were, in each year, three deaths from tuberculosis for every thousand of population, in New York there were only one and a half per thousand. Brave and beautiful France had to mobilize a great army and had to do it quickly. The thoroughly physical examination so essential for the discovery of tuberculosis, could not be made, and thus many a young man strongly predisposed had to enter the army in defense of his country. While military life even in trenches and dug-outs may be conducive to the increase of strength and vigor in the normal and healthy individual, the stress and strain of the soldier's life in war time, long marches, life in trenches and dug-outs, and the actual work on the firing line, will develop an active tuberculosis in the strongly predisposed, or in those already afflicted with incipient tuberculosis, often at an alarmingly rapid rate.

This must be the explanation of the great frequency of tuberculosis among the fighting soldiers in France. Although popular education against tuberculosis had been carried on some time before the war, it was not nearly so intensive and far reaching as in the United States. Thus, for example, in the United States we had 30 organizations doing anti-tuberculosis work in 1905. We have now 1,400 different anti-tuberculosis associations and committees. Dr. Biggs tells us: "At the beginning of the war there were in the whole of France only 1000 sanatorium beds for tuberculosis, and these were in private institutions. There were no provisions for the care of advanced cases, excepting as they were received in the general wards of the general hospitals." In the United States we have at this time 530 special tuberculosis sanatoria and hospitals with 35,000 beds. Aside from this, we have 450 clinics and dispensaries for the treatment of such cases which do not require or are waiting for institutional care. Of open air schools, which are little known in France, we have nearly 1,000. Thus there is in France a great scarcity of sanatorium and hospital accommodations for the tuberculous in the various stages of the disease, with only a small number of tuberculosis clinics available for the treatment of early ambulatory cases.

Aside from the lack of preventive and curative institutions we must mention another factor responsible for the seriousness of the tuberculosis situation at this time in France. With all our love and admiration for the French people, and particularly for our French brethren in arms, we must admit that as a whole they are not taught from their childhood the love of fresh air and the use of cold water as invigorating agents as is the average American boy or girl. This is the fault of their tradition, and their prejudice against the use of cold water and fresh and cold air by day and by night must be overcome in order to reduce the frequency of tuberculosis among the French people. Of course, the hardship this war has imposed upon the French civilian population, the deportation of many of them and the sufferings they had to endure during their enforced absence from home, is largely responsible for the fearful increase of tuberculosis among these people.

All the sad conditions which predispose the individual to tuberculosis, either by heredity or custom, and those which are acquired by privation, want, lack of food and air, physical and mental suffering, have combined to increase the number of tuberculous individuals throughout France. Fortunately for the American soldier, his early training in the love of fresh air and the use of cold water on his body have made him naturally more resistant to the disease, and to the honor of our military surgeons it must be said that

the examinations at the recruiting offices are most thorough, so as to weed out those who are strongly predisposed to tuberculosis or already afflicted with the disease in the incipient stage. The examination is repeated after a few months' training so as to make sure that no tuberculous invalid is in active service. Yet, the possibility that some of our soldiers may develop tuberculosis must be admitted; but even should this occur, if the American boy now serving under arms in France will remember his obligation to his comrades, to himself, to his country, and to his allies and profit by these few words of advice, he will not be in great danger of the disease and will be well taken care of if he should get it. There are, as already stated, a large number of institutions which will take care of him on his return home. Many public and private sanatoria throughout the United States have offered to take care of any of the American soldiers who may be returned from France as tuberculous invalids. Do not be discouraged even if you should get a tuberculous infection. The disease is nearly always curable in the early stages.

What can the American soldier, now in France, do to help in the fight against tuberculosis?

I have already stated in my short preface that this essay is written not only to protect our American boys, but also in the hope that by example and teaching they may help to combat this disease of the masses among their French comrades as well as among the citizens with whom they may come in contact.¹

Most French people and not a few Americans still fear the night air and are too much afraid of drafts as being most dangerous and the cause of catching colds. First of all, the practice of sleeping with the window open at night in winter and summer should be taught by example and by word of mouth or by printed instructions. But this must be done with great tact so as not to offend. These good people should be made to realize that night air is as good as day air and even purer, for as a rule there is less traffic, less commotion, and less dust in the air at night. Drafts are only dangerous to the individual when he has perspired and the pores of his skin are open; at all other times drafts are beneficial since air currents and winds tend to purify the atmosphere. Under ordinary conditions colds are never contracted from drafts, but are due to infection just as much as tuberculosis, for all gripes and colds are due to certain specific organisms; the germ of the former is known under the name of Pfeiffer bacillus and the latter by the name of bacillus of catarrh.

It is in the closed and badly ventilated room that the ordinary germs of cold, influenza, measles, whooping-cough, and sometimes even the germs of pneumonia are spread by persons coughing into the air. We have already alluded to the precautions every individual should take during the act of coughing, no matter whether he thinks he is ill or not. Ordinary colds, grippe, measles, whooping-cough, bronchitis, pleurisy, and pneumonia are often the forerunners of tuberculosis and we should do all we can to prevent them by hygienic methods; we will thus reduce the frequency of tuberculous disease.

To clean the dust from furniture with the feather duster is still a favorite practice in French and in many American homes. It is in reality one of the most unhygienic ways of cleaning. It does not clean but simply causes the dust to settle in another place, and the people who dust as well as the people who live in rooms cleaned by this method are subject to inhaling the dust which in many instances is not free from disease-producing germs. It

¹A French translation will be available for distribution to their French comrades.

may be said that the same conditions result from dry sweeping of rooms or corridors. The use of moist sawdust or the moist used tea leaves of immemorial English custom, or newspapers torn up, moistened, and strewn on the floor suffices to allay the dust. Cleaning furniture with a moist or slightly oily cloth is far more hygienic and more effective.

To avoid the possibility of becoming infected or infecting others, you should never kiss any one, especially not a child, on the mouth. The French custom of kissing on the cheek is far more hygienic. Do not swap eating or drinking utensils, and see that they have always been thoroughly cleaned before use.

Any one who has never used a cold water bath and is fearful of not reacting, that is to say of not getting warm again after its use, can easily become accustomed to this health giving measure by beginning to take his cold water application in the morning in the following way: Stand in a tub containing moderately hot water a few inches in depth and have within easy reach a washbasin full of cold water in which a large sponge has been placed. Squeeze out the sponge full of cold water rapidly over the back, holding it at the neck, then in front over the throat, and over each shoulder, in such a way that the whole body receives an ablution of cold water. Dry yourself quickly, not necessarily very thoroughly, and return for a few minutes to the bed which had been covered after leaving it so as to retain the warmth. Reaction is thus assured absolutely. By this method any individual can train himself to the use of a cold ablution, showerbath, douche, or cold plunge,

In most parts of France there is even a prejudice against drinking water. Now it should be distinctly understood that next to fresh air, there is perhaps no greater factor in keeping a man well and strong than a plentiful ingestion of pure water. A moderate quantity (about a glassful) with meals and two glasses between mealtimes is most conducive to good health.

If the American soldier should come in contact with any comrade or man, or woman of the civilian population in whom he should recognize, as a result of the study of this little brochure, the symptoms of a tuberculous disease, let him urge his friend to see a physician and institute such precautions as are necessary to avoid the possible conveyance of the disease to others.

In most American communities, every case of tuberculosis is reported to the health department, whence the physician, if he so desires, can obtain literature which will enlighten the patient and his friends as to the best methods of prevention and cure. In the United States there is usually a large corps of trained nurses attached to the health departments for the purpose of visiting the tuberculous poor, teaching them practical hygiene, and seeing that the physician's directions for food and medicine can be and are carried out. If the people are too poor to obtain good and nutritious food, special tuberculosis committees attached to charity organization societies help to obtain it.

What are the agencies now at work to help the French soldier who may have contracted tuberculosis?

The Rockefeller Foundation has sent a tuberculosis commission to France composed of expert diagnosticians, sanitarians, and trained nurses, under the leadership of Professor Livingston Farrand, formerly the Executive Secretary of the National Association for the Study and Prevention of Tuberculosis, and Dr. James Alexander Miller, Director of the tuberculosis service of Bellevue Hospital, New York City. In co-operation with the American Red Cross and the French authorities they will foster an educational campaign and establish tuberculosis dispensaries, preventoria, sanatoria, special hospitals, and agricultural colonies. In the sanatoria and hospitals the unfor-

fortunate French soldiers who have contracted tuberculosis may be taken care of. In these institutions they will not only have an opportunity to recover, but will learn by practical demonstration what to do and what not to do to prevent reinfecting themselves and infecting others, and the surest and best way to regain their health and strength and become fit to enter the ranks again. On returning home they will be useful citizens and will teach others by their example what to do so as not to contract and spread tuberculosis.

What may we hope for regarding the tuberculosis problem in all civilized countries after the successful issue of this war of democracy against autocracy?

Since tuberculosis is as much a social disease as it is a medical disease, the prospect of combating the social causes will be brighter when militarism and autocracy will have disappeared from civilized countries. The countries which are now the enemies of the Allies will also become democratized and there will be a united Europe as there is now a united America. Social justice for all will then be the maxim, and there can be devoted to the betterment of the social conditions of all peoples the countless millions of dollars that are now spent for maintaining fighting armies because one country would not consent to disarmament, but wished to dominate the world by brute force and uphold the maxim that might makes right. Medical science will then once more be able to devote all its energy to the prevention of disease. All other branches of science, now utilized in the practice of war, will likewise be consecrated to the betterment and advancement of human happiness, comfort, health, and the enjoyment of life, and, with these blessings attained, the disease which has justly been called the great white plague, one of the greatest enemies of mankind, will disappear. Thus in the end the sacrifices of life, property and treasures beyond price made by millions of brave men, women, and even children will surely lead to a higher civilization where lasting peace on earth and good will toward all men will reign supreme.

DIAGNOSTIC AND THERAPEUTIC NOTES.

TREATMENT OF FURUNCULOSIS BY TIN.—In May, at the Académie des Sciences, Gregoire and Froin drew attention to the fact that tin-workers never suffer from boils, and that powdered tin is a popular remedy for this complaint. They tried the effect on 50 cases of furunculosis, giving powdered tin or the oxide of tin in doses of from 50 centigrams to 1 gram. In every case a cure was obtained in from 5 to 14 days. Some among these, who were treated over six months ago, have not had any relapse. Hudelo reported the effects of the same powder in a further series of cases, in each of which a successful result was obtained. He gives a mixture of powdered pure tin and oxide of tin, 25 centigrams of each, in a cachet.—*Journal des Praticiens*, June 2, 1917.

SULPHUR TREATMENT OF PSORIASIS.—Louis Bory reported to the Société Médicale des Hôpitaux some results obtained by the use of sulphur internally for the treatment of psoriasis. For this purpose the solution of pure sulphur, suggested by Jacquet, was given by injection, but Bory added eucalyptol to the solution. The composition, therefore, was:

Pure precipitated sulphur.....	20 c.g.
Sterilized oil of sesame.....	80 cc.
Eucalyptol.....	20 cc.

The solution is injected deeply into the muscles of the buttock in a dose of 4 or 5 cc. every three or four days. The injections are almost painless and are borne perfectly well. In the most of the cases the skin gradually became normal in the course of a few weeks. Only a few cases have been treated in this way at present, but the results are most encouraging.—*Journal de Médecine et de Chirurgie Pratique*, June 10, 1917.

SECONDARY ABDOMINAL PREGNANCY.—Dr. Bruno Quarella (*Ann. di obstet. e ginec.*, Nov. 30, 1916, XXXVIII, pp. 481-491) has reported an extraordinary instance of secondary abdominal gestation following upon a perforation of the uterus. The patient, a multipara of 45 years, had suffered some time previously from parametritis. She confessed that after a period of two months' amenorrhea an attempt had been made to procure abortion, and that this attempt had been followed by uterine hemorrhage, violent abdominal pain, and vomiting. Gradually these phenomena passed off, but menstruation did not return. About the fifth month of amenorrhea she had a severe abdominal crisis, lasting for a week, and two or three other similar attacks had occurred at decreasing intervals of time. The breasts and abdomen showed the ordinary signs of pregnancy, and palpation revealed a rounded, ill-defined swelling and irregular consistence in the lower part of the abdomen. The bimanual examination discovered the uterus pressed forward against the pubic arch and difficult of delimitation; there was a projecting mass in the posterior fornix. No fetal heart or uterine souffle could be heard. The diagnosis of extra-uterine pregnancy was made provisionally, and the abdomen was opened by Professor Bobbio. The uterus, as large as the adult fist, was found lying to the front and slightly to the left side; the pouch of Douglas and the right half of the true pelvis were occupied by a fleshy mass, which turned out to be the placenta; an umbilical cord was next detected, and followed to a fetus, which was discovered lying free (without a bag of membranes) among the intestinal coils; and the cord was cut and the fetus, which

lived for three hours and had a uterine age of about six and a half months, was quickly extracted. The operator then proceeded to extract the placenta. It was easily separated from the rectum, the pouch of Douglas, and the pelvic cavity; but it was so firmly fixed to the posterior surface of the uterus that attempts at removal were followed by hemorrhage and the discovery of a perforation of the uterus. Subtotal hysterectomy was consequently decided upon and quickly performed; but at this point the patient, who had been taking the anesthetic badly, fainted, and although all efforts were made to restore the heart's action, she died in about half an hour. The examination of the uterus revealed a perforation in the posterior wall about 3 cm. in length and occupied in part by placental tissue. Obviously the attempt at abortion, carried out with a rigid instrument and with force, had perforated the organ and allowed the fetus to escape; the placenta had passed through the aperture also, with the exception of a small portion which maintained a vascular connection between the fetus and the interior of the uterus.

Dr. Quarella draws certain interesting conclusions from this rare case. The first is, that traumatism must now be regarded as one of the etiological factors in ectopic pregnancy; the perforation of the uterus may lead to the escape of the fetus and of part of the fetal membranes and placenta into the peritoneal cavity with the establishment of secondary abdominal gestation. The second is, that the fetus may develop whilst lying free in the peritoneal sac, and may actually reach full term alive, normal, and capable of postnatal existence. In the third place, the case exhibits the greater difficulty which exists in the diagnosis of a late than of an early extra-uterine pregnancy. In the fourth place, additional evidence is afforded of the extraordinary difficulty which exists in deciding upon the best form of operative interference in such ectopic pregnancies as go to the full time. The great danger arises from the hemorrhage following upon the separation of the fetal annexa, and especially of the placenta, from the tissues to which they have become adherent. If the fetus has died it is generally thought to be well to allow a week to elapse so as to lessen the bleeding from the placental site during the operation. If the fetus is still alive some operators would open the abdomen at the thirty-fourth or thirty-sixth week, others at the thirty-eighth, and yet others during the first two weeks of the ninth month. As a general rule, the abdominal is to be preferred to the vaginal route for the removal of the parts; and sometimes it is wiser to leave part of the fetal annexa in situ, closing the abdomen partly and draining. Of course the ideal plan is total removal of all the fetal annexa, with complete closure of the abdomen, but it is not always practicable or safe.—(*Edinburgh Medical Journal*, October, 1917.)

INTRASPINOUS MEDICATION IN PARESIS.—Evans and Thorne report the result of two and one-half years' experience on the intraspinal method of medication in general paralysis of the insane. Twenty-three patients were subjected to a series of intraspinal treatments with salvarsan, neosalvarsan, and albuminate of mercury. The smallest number of injections given to one patient was three and the largest number twenty. The Wassermann reaction was temporarily reduced to negative with the blood serum of one patient and with the cerebrospinal fluid of three. Three patients showed some mental and physical improvement; ten died, four during the course of treatment and six several months after the treatments were discontinued; ten are living and are markedly demented. They find that the intraspinal method of treating paretic dementia has had little or no therapeutic value in their series of cases.—(*New York Medical Journal*, September 8, 1917.)

BOOK REVIEWS.

THE PRACTICE OF OBSTETRICS. Designed for the Use of Students and Practitioners of Medicine. By J. Clifton Edgar, Professor of Obstetrics and Clinical Midwifery in the Cornell University Medical College; Visiting Obstetrician to Bellevue Hospital, New York City; Surgeon to the Manhattan Maternity and Dispensary; Consulting Obstetrician to the New York Maternity and Jewish Maternity Hospitals. Fifth edition, revised. Twenty-second thousand. With 1,316 illustrations, including 5 colored plates and 34 figures printed in colors. Philadelphia: P. Blakiston's Son & Co.

The very popularity of this volume gives its author the unusual opportunity of keeping the text in harmony with the very latest advances of both the science and practice of obstetrics. This, the fifth edition, contains most enlightening articles on painless labor in general and on twilight sleep in particular. Much new matter will be found in the chapter on the artificial feeding of infants. The work is too well known to call for a description of its scope or for praise of its value.

THE INTENSIVE TREATMENT OF SYPHILIS AND LOCOMOTOR ATAXIA BY AACHEN METHODS. By Reginald Hayes, M. R. C. S., etc. Second edition, revised. London: Bailliere, Tindall & Cox. 1917.

Briefly, this monograph is a plea for the more general use of the inunction method in the treatment of syphilis. The author does not pretend to set forth anything new. His cry is that we are neglecting a valuable and proved method, and one cannot read through this little volume without realizing that in the delirium of our enthusiasm over the arsenic preparations and the various injection methods we have forgotten some useful facts. There is no attempt to discredit the value of the arsenic preparations, nor does the author feel that there is no place for hypodermic mercury therapy. But the necessity of using mercury in addition to arsenic is now generally recognized, and the many disadvantages of the injection treatment leave much to be desired. For these reasons the inunction method should not be forgotten. Much depends on the attention which is paid to the details of the treatment, the baths, skillful massage, etc., and there is detailed account of the author's modeled on the system as practiced at Aachen. Considerable stress is placed on the value of the coincident drinking of sulphur water, a part of the Aachen method. Whether this phase of the treatment is of real value is a matter for speculation. The book will well repay the half hour necessary for its perusal.

A PRACTICE OF GYNECOLOGY. By Henry Jellett, M. D. (Dublin University), F. R. C. P. I.; Master Rotunda Hospital, Dublin; Formerly King's Professor of Midwifery and Gynecology, etc. With 374 illustrations, many in color, and 11 colored plates. Philadelphia: Lea & Febiger. 1916. Price, \$6.

This really is the fourth edition of the author's Short Practice of Gynecology, now appearing in a thoroughly changed form, having been distinctly broadened in its scope. In general, this volume reflects up-to-date gynecologic teaching in a decidedly attractive form. The menstruation question and the problem of internal secretion in its relation to gynecology are very ably presented. The chapters on radiotherapy and vaccine treatment are well written, and

cover their respective field in a thorough manner. The work everywhere gives ample space to a clear discussion of conservative methods of treatment. In the chapter of uterine displacements the prevalence of illustrations dealing with the pessary, etc., over those illuminating operations is worthy of emphasis and praise. The reproduction from Jolly's atlas of the splendid microscopic pictures of uterine scrapings greatly adds to the excellency of the volume. In view of all these commendable features, one is surprised to find under diseases of the vulva no reference to luetic lesions, or to meet the old, and now decidedly antiquated, classification of endometritis without any mention of the notable work of Hitschmann and Adler. The author still speaks of a carcinomatous degeneration of myomata. These are, however, but minor shortcomings in a noteworthy new work, and we trust that the author will find an early opportunity to eliminate them in a new edition.

FIRST LESSONS IN SPOKEN FRENCH FOR DOCTORS AND NURSES. By Ernest H. Wilkins, Algernon Coleman and Ethel Preston. Chicago: The University of Chicago Press. Price, 50 cents.

This is a book of some 130 pages, of a convenient size for the pocket, and very clearly printed. It is intended for the use of American doctors and nurses, and has been specially written to facilitate the acquirement by them of spoken French, although the written language is not neglected. There is nothing conventional about this book, which is, on the contrary, refreshingly original in methods, presentation, and material. A special effort has been made to represent French sounds throughout, and the notation employed is as adequate as is possible. An intelligent student, with the thoroughness and patience to master completely the instructions, would undoubtedly get a good working result, while, if coupled with the aid of a French-speaking teacher, the phonetic system used in this book would render an almost accurate vocalization possible. On the other hand, the slightest inattention to the explanation of the system would, in the absence of a teacher, produce disastrous results, as the instructions are not repeated. For this reason it might have been well to have made a summary table of equivalents, and to have placed it on a large bookmark attached by a ribbon to the binding, such as is used in Watt's Dictionary of Chemistry for abbreviations. This renders easy immediate reference and keeps constantly before the student the equivalents of the phonetic notations. The authors have done their work well, and have shown much skill in the arrangement and discretion in the choice of material.

DREAM PSYCHOLOGY. By Maurice Nicoll, B. A., M. B., B. C. (Cambridge), Captain (Temp.) R. A. M. C. New York: Oxford University Press. 1917. Price, \$2.

A little book destined for the psychologically inclined layman rather than for the physician. The author presents in a simple manner Jung's theory of dream interpretation. Aside from numerous unnecessary repetitions and the presentation of much material perfectly familiar to physicians and most intelligent laymen the book is fairly interesting. Numerous dreams are given and interpreted superficially. The author adds each time that there is much of a deeper nature, but asks the reader to be satisfied with the superficial explanation. It would have been wiser to have given fewer dreams and to have gone into the interpretation of them more thoroughly. The dream, according to Nicoll, presents a life program to the patient, which, if followed, will bring peace and happiness. It shows him his mistakes and points the way to a readjustment of his life. Freud's libido theory is, of course, refuted. In the first chapters the author discusses the conscious and unconscious mental realms

and the symbolism of dreams. He then considers dream interpretation. Although dreams may be at times compensatory (Freud's wish fulfillment), they usually present a program comprising suggestions as to how the patient may readjust his life. According to Nicoll's superficial handling of a complex subject, this is all quite simple. For example: A woman who has too many irons in the fire dreams she is to make a journey. The floor is covered with numerous articles which she finds impossible of packing into one trunk. She rushes into the street and confronts a multitude and misses her train. The numerous articles represent the too many things she is trying to do. The multitude represents the too many people she tries to keep up with. Presto! the program is complete. She must not try to do so many things, and must not try to go about with so many people, and she will not miss her train of health and happiness. If dreams were really so simple of interpretation, we would have no need for analysts. Nicoll, after much effort, discovered the word "interest" to replace our perfect term for psychic energy, libido.

THE NEW SYSTEM OF GYNECOLOGY.—Edited by Thomas Watts Eden, M.D., F.R.C.S.E., F.R.C.P., Temp. Major R. A. M. C.; Vice-President of Section of Obstetrics and Gynecology of Royal Society of Medicine, etc.; and Cuthbert Lockyer, M.D., B.S., F.R.C.S., F.R.C.P., Vice-President of Section of Obstetrics and Gynecology of Royal Society of Medicine, etc. In three volumes, with numerous illustrations in color and in black and white. New York: The MacMillan Company, Ltd., 1917. Price, \$36.

Though produced under the handicap of the war, this new system of gynecology in three volumes seems perfect in every respect. With the exception of two Americans, Franklin H. Martin, of Chicago, and Howard C. Taylor, of New York, practically all the other contributions to this splendid work have been made by the most representative of British gynecologists. Looking over this long list of well-known names, one is struck by the frequency with which it is stated that the man now is engaged in war service. One can well imagine the enormous difficulties of the editors in completing so successfully their great task amid the many preoccupations of these times.

In the case of subjects not solely within the limits of gynecology, the editors secured the assistance of distinguished men with special knowledge. It may be stated in this connection that some of these latter contributors, while presenting most authoritatively their assigned subject, have failed to set forth distinctly enough the specific relation of the subject to gynecology, a short coming particularly evident—e. g., in the contribution on the examination of the blood.

But it seems unjust to emphasize such defects in view of the patent fact that the majority of the monographs are of unusual excellence, too numerous to be mentioned individually. Contributions like those by M'Ilroy on the physiology of the reproductive organs, or by William Blair Bell on the disorders of function, stand unsurpassed in the English language. It is difficult to conceive that the subject of backward displacement of the uterus could be dealt with in a clearer or more comprehensive manner than is done by W. W. Chipman. The article by G. F. Blacker on ectopic gestation discusses the entire problem thoroughly, both from the scientific and practical point of view, without the omission of a single detail of importance. Still, the article is free of that tiring enumeration of endless statistics and of quotations from numberless contributors so characteristic of the typical German handbook of formidable size. Blacker's article is readable, and therein lies the characteristic difference. Veit's "*Handbuch der Gynaekologie*" stands on the shelves of every gynecologist and surgeon, to be consulted whenever he desires accurate and detailed information concerning all the contributions that have been made on any given subject, but Eden's and Lockyer's new

system will lie right on the desk of every gynecologist and surgeon, to be read and enjoyed whenever he finds time to familiarize himself with the very latest developments in the wide field of gynecology and its allied subjects.

MIDWIFERY. By Ten Teachers. Under the direction of Comyns Berkeley, M. A., M. D., M. C. (Cantab.), F. R. C. P. (London), Obstetric and Gynecological Surgeon to the Middlesex Hospital, etc. Edited by Comyns Berkeley, H. Russell Andrews, and J. S. Fairbairn. Illustrated. London: Edward Arnold. 1917.

We are told in the preface to this volume that it is the joint product of ten teachers. The subjects dealt with were portioned out among them. The manuscript furnished by each contributor was submitted to all others and then the entire matter criticized, amended, and partly rewritten at numerous joint meetings. Thus an effort was made to avoid the common disadvantages of collective authorship. The whole corps acted in an editorial and revisional capacity on every chapter of this book, and therefore is ready to accept general responsibility for the entire work. In other words, this is a composite picture of the views held by ten experienced teachers on every subject pertaining to obstetrics. Undeniably an original and interesting experiment in collaboration.

At first thought one would feel that the product of such a serious effort could not fail to be perfect, and it is with this feeling that the reviewer approached this attractive-looking volume. But as one reads chapter after chapter it becomes more obvious that the principle of writing a book in this manner also has its distinct shortcomings. Like any composite picture, it represents the mean average of physiognomy. There really can be only a few subjects on which ten teachers actually will agree, and what we then read as their agreed opinion is all too likely to be the old time-honored view on the subject. Striking new ideas, still in the state of lively and stimulating controversy, which often so pleasantly relieve the monotony prevailing in the average text-book, for obvious reasons are absent in this volume. If there is more than one accepted way of dealing with a condition—e. g., the treatment of eclampsia—rather impartially and most neutrally the various methods are set forth. The practitioner who, when in doubt, necessarily is seeking definite information concerning advanced ideas on any unsettled problem, will be disappointed when consulting this latest work on obstetrics. It is almost unavoidable that the views of ten teachers, sitting thus in a "peace conference" on mooted problems, will be pronouncedly conservative—just "safe and sane." Nevertheless, it is surprising that ten teachers of obstetrics could agree right on pages 1 and 2 (which proves somewhat discouraging) that, *as a rule*, ovulation occurs coincidentally with menstruation, and that when it occurs at other times it must be considered abnormal; or that they all felt satisfied with the statement (on page 4) that the ripe Graafian follicle may measure 3 centimeters in diameter.

This adverse criticism, however, must not be misunderstood. It is meant to be directed more against the principle of this particular type of collaboration than against this particular volume itself. As a whole, this is not only a fair, but, indeed, a truly splendid presentation of obstetrics in its present stage of development. The volume is well and carefully written. No problem of any importance is omitted in the discussion, and yet the book is comparatively small and concise as the result of a most systematic arrangement. The really valuable result of this harmonious cooperation of ten men is evidenced in the commendable conservatism exhibited in such questions as the indications for major obstetric operations, in the timely warning against the indiscriminate use of pituitrin or the morphine-scopolamine combination, and, most of all, in the careful preparation and selection of over 300 unusually good illustrations.

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EDITORIAL.

GASTROENTEROLOGY.

The Modern Hospital Publishing Company, proprietors of the INTERSTATE MEDICAL JOURNAL, having purchased *The Proctologist and Gastroenterologist* from the estate of the late Doctor Barnes, a department of Gastroenterology will in future form a part of the INTERSTATE. We have been fortunate enough to secure the collaboration, as Departmental Editor, of Dr. Anthony Bassler of New York, the well known writer on this subject. Dr. Bassler is Professor of Gastroenterology in the New York Polyclinic School and Hospital and he is Chairman of the Section on Gastroenterology and Proctology of the American Medical Association.

A WORD OF ENCOURAGEMENT.

At a recent dinner of the American College of Surgeons words were spoken of our profession by a distinguished member of another calling which deserve perpetuation. The Reverend Father Moulinier, S. J., Dean of the Père Marquette Medical School at Milwaukee, speaking of his four years' official dealings with and, to a certain extent, in control of medical men, told his audience that he had been so impressed with their altruistic ideals and spirit of sacrifice that he had often remarked to members of his own cloth that, even in those respects, they might learn of the physicians.

Such an encomium, falling from the lips of one who belongs to an Order, to which, whatever our personal religious views or political leanings may be, we cannot deny a high standard of self abnegation, should be treasured by us as a comfort in these days, when so many mock and when we are so venomously slandered both by interested parties and by ignorant and narrowminded fanatics.

THE ABUSE OF WORDS.

Both Charles Mercier and Quiller Crouch have recently taken medical writers to task for the misuse of words. But we are not the only or the worst offenders.

There are two ways of abusing a thing. One may use it too much, or one may use it inappropriately. Both of these fates are commonly suffered by words. How tired we were all becoming of the expression "Along those lines," a good enough phrase, but overworked. Again the semi-slang "Search me" has become almost tiresome. Yet in its origin it was a genuine witticism; it painted a word-picture with the greatest economy. We could figure to ourselves a fussy, overanxious person addressing his tale of woe to a relatively indifferent friend, with that tone of quasi-complaint, nearly accusing, to which the "Search me!" was so appropriate and final a quencher. Yet now, used in and out of season, it fails to impress; our receptors for its wit are fatigued.

Headline writers, in this as in almost every possible respect, are grave offenders. Take a favorite word of their—"clash." From its natural use as applying to a noisy encounter, through its figurative application to the verbal swordplay of wits, it reaches the *reductio ad absurdum*, when a journalist describes a chess match as a "clash"!

Of simple inappropriate employment of words and phrases there is such a daily abundance that one is embarrassed in one's choice.

Sometimes the fault comes from carelessness, sometimes from ignorance, sometimes from a desire to write picturesquely.

In the Sunday edition of a highly esteemed Eastern contemporary there appeared some months ago, from the pen of a novelist, an article on the "Spirit of France." Desirous, probably, of adding authority to his statements, the author used French and French expressions somewhat freely, with unfortunate results. In one place he spoke of the new attacking character of the Allies' operations as removing the discouragement of the civilians behind the war zone. Or, rather, that is what he would have said had he been content to use English. What he did say was "discouragement which attacks the '*civils en derriere*.'" This does not quite mean anything in French, but it nearly means attacking civilians where they sit down. In another place he says that one hears no more of a "war of usury," evidently mistranslating Joffre's phrase, "*Une guerre d'usure*," which means a "war of attrition."

The word "prone" is particularly unlucky. In a florid description of the execution of a Dutch dancer in Paris, a reporter spoke of the body as "lying prone with the eyes turned to the skies." Sometimes a confusion of two analogous ideas, expressed by similar phrases, trips up the unwary writer. When a Chicago headliner

compounded the two expressions "to make short work of" and "to give short shrift to," announcing that Uncle Sam would "Make Short Shrft of German Spies," one made the not too violent assumption that he did not know the meaning of "shrft." But what are we to think when the esteemed *Literary Digest*, which affects to guide us, falls into the same ditch?

A well-known firm of automobile manufacturers whose machines possess two different ranges of speed seeks to emphasize this feature in an advertisement in which it is said that, with their cars, "you can run with the hare or hunt with the hounds," a singularly inapt figure for a great difference in speed.

To those who would say that these objections are pedantic, since the words as used, however wrongly as judged by academic standards, served the purpose of conveying the writers' meaning, I would reply, "Yes, and if your wife uses your razor to sharpen her pencil, it may serve her purpose, but it does not improve its qualities as a shaving implement."

WHERE DEATH DELIGHTS TO SUCCOR THE LIVING.

The importance to the advance of medicine and to the full utilization of the vast amount of clinical material accumulating in our hospital records of obtaining the maximum number of postmortem examinations on the bodies of those dying in institutions can scarcely be overestimated. Unfortunately the value of the information so afforded is matched by the difficulty of obtaining permission to make the desired examination.

This opposition to autopsies is partly founded on sentiment and partly derived from ignorance.

So far as it is sentimental much may be done by the medical profession and by those in charge of pathological departments toward removing this obstacle. The architect, also, can play his part.

The sentimental objection to the mutilation of the remains of those dear to us cannot be dismissed by calling it foolish. Each of us, speaking of our profession, is probably more or less indifferent as to the manner of disposal of his own body after death. But I question if many of us are as indifferent when it is a question of the body of one of our dear ones.

The first step, therefore, towards removing the sentimental objection, as distinguished from one originating in ignorance, is to impress on the responsible survivors the view that an autopsy is far from being a desecration.

The phrase used as a title to this article is translated from a Latin motto inscribed on the frieze of the autopsy room of the

Medical School of Toulouse. It might well serve as the text for our argument. It should stimulate the survivors to rise above their own sorrows and to allow humanity at large to benefit by their loss.

But such a line of reasoning would gain immeasurably if objective proof were presented that an autopsy is truly a reverent ceremony, as it should be. The surroundings and outward appearance of our postmortem rooms are far from inspiring any such feeling. On the contrary they are, for the most part, of a dinginess verging on the gruesome. To judge only by the surroundings in which they work, one might be tempted to conclude that pathologists were obliged to hide their doings, that their business was that of a pariah caste, like that of the embalmers of Ancient Egypt, who, having executed their task, fled from the mourners of the dead.

Let us build our pathological theaters in a style appropriate to their functions and yet instinct with the solemnity of the presence of Death.

Were this done it would be easier to overcome the sentimental objections of the relatives.

Of the objections to opening the corpse, which are founded on ignorance, no doubt the most important and the most delicate are those which spring from supposed religious sanctions. Scarcely ever will these be found to stand examination. In Mohammedan countries it is becoming daily easier to obtain autopsies. In one of the most important Jewish hospitals of the Middle West, the difficulty was solved by a superintendent in a characteristic fashion. The religious heads of the Hebrew community were invited to meet him. The importance of the autopsy was explained and at the same time it was told them that many of their co-religionists refused permission for the operation on the ground that it was forbidden by the religious law. Many of the rabbis were also of this opinion, but they took the question under advisement. At a second meeting it was unanimously agreed that diligent search had failed to discover any provision of the law which forbade the opening of the body. A similar step with other religious leaders might produce the same fortunate result. Were it to turn out thus there would be the added advantage that the active support of the religious adviser, than which none could be more powerful, might be gained for the performance of the autopsy.

COLLECTIVE ABSTRACTS

THE INTERNAL SECRETION OF THE TESTES.

By HOMER WHEELON, A.B., M.S.

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Many theories have been offered to explain the causes which differentiate the two sexes. Ancient scholars were prone to believe that the external genital organs, and in the female the breasts, constituted the determining factors of sex. This view is still held among certain primitive peoples. Such beliefs are creditable to a people not familiar with anatomy and direct experimentation. The French physician Chéran sounded the advance of modern teachings in the statement, "*Propter ovarium solum mulier est quod est.*" Virchow expressed the same idea when he said, "*Woman is woman by reason of her generative glands.*" He might also have added that man is man because of his generative organs.

The now absorbing theoretical and practical interest manifest in the endo-secretory glands had its practical conception in the latter part of the nineteenth century. This conception came as the result of experimental work upon the sex glands.

In 1849 Berthold,⁴ of Gottingen, removed the testes of cockerels and replaced them in other parts of their bodies, and found that the sex characters persisted. From these findings he necessarily concluded that the testes gave rise to a product which acted upon other organs of the body. His work stands as the first experimental proof that an organ possesses the ability by means of an internal secretion to exercise an influence upon the development and structures of the body and materially modify its activities. This fundamental work of Berthold's, true to tradition, remained unappreciated until Brown-Sequard,⁶ on experimental work far less satisfactory than that of Berthold's, reintroduced the idea that various organs yield products which react upon other body structures.

In addition to the differentiated genital organs, the gonads, which form the primary qualities of sex, are other phenomena, as pointed out by J. Hunter, by which the sexes are characterized—namely, "secondary sexual characteristics." These consist of all those specific appearances which are not immediately concerned with the processes of reproduction. It, therefore, appears that the testes possess a dual function—namely, the production of spermatozoa and the maintenance of the outward manifestations of the male characteristics.

The results of Berthold's work, therefore, made possible an understanding of the relations existing between the testes and the outward characteristics of the male—that is, the dependence of the male characteristics on the testes directly.

It is generally taught that the primary function of the testes is the production of spermatozoa. One may, however, justly ask as to whether the testes are primarily involved in the process of reproduction of species or for the development and maintenance of the male character. It seems, however, that a proper relation or balance must necessarily be maintained between

the factors that give rise to maleness and the proper production of sperm in order that reproduction may be made possible. The question then arises as to whether the production of sperm is essential to the maintenance of masculinity. Tentatively it may be answered in the words of Corner:¹¹ "The secondary sexual characteristics are a far more exact measure of the value of the testicular tissue than are the presence of spermatozoa in the external secretions."

CASTRATION, TESTICULAR TRANSPLANTS, AND EXTRACTS UPON THE SECONDARY SEXUAL CHARACTERS.

The profound alterations of growth and development following castration of young animals is one of the oldest and most common observations. For an extensive review of the effects of castration the reader is referred to the works of Biedl⁷ and Marshall.⁴⁸ In brief, the results of gonadectomy before puberty prevents in the human male the complete development of the nervous system and its functions, the usual growth of hair upon the face and body, arrests the proper development of the chest and pelvis, preserves the high pitched voice of boys, and retards the proper closing of the epiphyseal synarthroses.

From Berthold on, investigators have endeavored to offset the deleterious effects of gonadectomy by means of testicular transplants and extracts.

According to Nussbaum³¹ there is formed in the male frog at the beginning of the breeding season a thickened pad of skin on the first digit of each fore limb, associated with an increased development of musculature in the arms—a modification preparatory to the act of copulation. Castration prevented this seasonal development in the fore limbs. If pieces of testes from a normal frog were grafted into the dorsal lymph sac of the castrated frog, the secondary sex characters of the latter developed just as in normal individuals.

Walker⁴⁴ has shown that the subcutaneous injections of testicular extract will not prevent the gradual atrophy of the prostate glands and seminal vesicles which result as the effect of castration in adult life.

Wheelon⁴⁵ and Shipley⁴⁶ gave results to show that transplantation of testicular tissue to a great extent relieved the depression of the vasomotor apparatus which resulted because of castration; also that dispositional changes may result as an effect of gonadectomy.

Cobb⁴⁹ suggested that testicular extracts should be administered in certain cases of neurasthenia.

Steinach⁴⁰ successfully castrated male and female white rats prior to the age of puberty and transplanted the sex glands into individuals of the opposite sex. As the animals developed they demonstrated characteristics peculiar to the type of reproductive organ tissue they carried rather than to their previous male or female somatic structures.

Surgeons, inspired by the results of laboratory experiments, have attempted and successfully grafted testicular tissue in the human subject.

Lepinasse,²⁶ of Chicago, in 1913, satisfactorily transplanted slices of testicular tissue into a castrate. The man regained his sexual powers completely, both as to desire and power to perform. These powers continued two years—the period under observation. Lydsten²⁰ reports favorable results in a case of psoriasis as the result of a testicular transplant. Lichtenstern²⁸ reports a case of a soldier who had been so badly wounded that he lost the power of erection and was without libido, and began to show manifestations approximating those of a castrate. A second soldier suffering with an inguinal testicle was operated upon, and the removed testis split and grafted into the abdominal musculature of the first patient. Within six days libido and erections returned. Tandler, in discussing the case, says that he has often coun-

seled this kind of an operation, although the transplant would be absorbed in about two years. One must always bear in mind that such pronounced reactions may be, to some extent, due to psychic conditions. Clinical results, however, so far have been satisfactory.

From such experiments there is but one conclusion to be drawn—namely, that the secondary sex characters are absolutely dependent on the reproductive glands for their maintenance.

Castration necessitates the complete removal of the primary reproductive organs; hence results obtained by such a procedure may be interpreted as due either to the loss of sperm-producing tissue or other structures present in the testes—i. e., Sertoli or Leydig cells. The studies on the effects of castration, therefore, simply locate the organ whose presence is necessary to the development of the characters essential to masculinity. The beneficial effects of the presence of testicular transplants or the injection of extracts are open to the same criticisms. Therefore a consideration of the results of castration, testicular extracts, and transplants do not directly throw light upon the structures which elaborate this internal secretion. Moreover, up to the present time it has not been shown that a substance is present in the return blood stream from the gonads which will produce the same results as transplants—that is, no substance has been isolated from the testes which is comparable, for instance, to the secretion isolated from the adrenal glands.

Nevertheless, results such as given above justify the contention that the gonads do liberate a substance which reacts upon other parts of the body; hence they must necessarily develop and discharge an internal secretion. *A priori*, one would scarcely think that a structure so highly specialized as the sperm-producing or seminiferous tubules would carry on a dual action. Eliminating the seminiferous tubules, we have remaining in the testes the Sertoli cells and the interstitial tissue, one of which must give rise to the testicular hormone. Present evidence points to the interstitial cells as the tissue responsible for the secretion so necessary to the adequate development of the body.

THE INTERSTITIAL CELLS.

The interstitial cells were first described by Leydig²⁷ in 1850. Kölliker,²³ 1854, pointed out the constant presence of these cells, not only in the interstices of the seminiferous tubules, but also in the mediastinum and connective tissue septa of the testes, and under the tunica albuginea.

Leydig's cells are of mesenchymal origin, and appear in the primitive genital tract at an early phase of embryonal development, before the seminal cells have formed their cytological character. Microscopically these cells vary greatly in the same species from time to time and also in different species. They lie surrounding the capillaries going to the seminiferous tubules. The cells are irregularly polygonal in shape. The nucleus lies eccentrically, and is surrounded by a condensed endoplasm which passes into a less dense vacuolated ectoplasm. With special stains the picture varies somewhat, as pointed out by Hanes¹⁸ and others. The dense endoplasm around the nucleus is composed of closely packed granules, and the relatively clear ectoplasm contains fewer granules. Fat, although variable, is never entirely absent. Soluble and insoluble pigments are common constituents of the interstitial cells of many animals. Whitehead,⁴⁷ from his microchemical study of Leydig's cells of the pig, has shown that they possess in their cytoplasm definite granules, which, he concludes, consist of a combination, either physical or loosely chemical, of proteid with fatty material. In the cat these granules consist for the most part of phosphated lipid material; cholesterinester and neutral fat are also probably present. Regaud³⁶ also demonstrated granules in the cytoplasm of these cells.

As late as 1906 Nussbaum³¹ advanced the theory that the generative portion of the testes was the site of production of its hormone. As evidence of this theory he cited the coincidence of development of rutting organs with the most rapid development of spermatogenic cells. He also suggested that it was the secretion of the spermatogonia—i. e., spermatids—which at rutting seasons supplied the impulse to the development of the seminal vesicles and other rutting organs. This view can no longer hold, as the weight of evidence points strongly to the interstitial cells as the seat of proliferation of the sexual hormone.

Tandler⁴¹ has shown that prior to spermatogenesis there is a great development of interstitial cells. These same observations have often been reported in various animals and in man. Lecaillon,²⁴ 1909, found in moles that the interstitial tissue of the testes is functionally active during the breeding season, when the testis is 64 times larger than during the resting period.

According to Bouin and Ancel,⁹ 1905, development of interstitial gland substance in the adult horse coincides with the first occurrence of spermatogenesis. They also pointed out that there was a fetal interstitial gland, which disappeared at the end of gestation, and a slightly developed gland composed of xanthracome cells, which was found only in the immature animal.

Formerly the interstitial cells were regarded simply as trophic tissue elements, whose function it was to take up nutrient material from the blood vessels and pass it on to the Sertoli cells. This view obtained favor because of the works of Regaud,³⁶ 1901; Plato,³⁷ 1896; von Lenhossék,²⁵ 1897; Harvey,²⁴ 1875; von Bardeleben,³ 1897, and Goldmann,¹⁶ 1909.

Reinke,³⁷ as early as 1896, suggested that Leydig's cells might elaborate an internal secretion which played an important part in the production of the sexual instincts. His belief was founded on the fact that he found in the testes of an executed criminal certain crystals in the interstitial cells and lymphatics. Reinke's crystals have been found only in the human testicle. It remained for Bouin and Ancel⁹ to first describe the cells of Leydig as the "*la glande interstitielle*." In the course of their work they demonstrated that the "interstitial gland" performs all the functions with which the internal secretion of the testicle had up to then been credited. Subsequent work has failed to disprove their theories, but rather added further evidence in their support.

INTERSTITIAL CELLS AND PATHOLOGICAL CONDITIONS.

The progressive physiological diminutions of the function of the genital glands is accompanied by senile changes in the cuticle and cuticular glands, in the hair, teeth, and in the muscular and nervous systems. Castration in young persons is followed by changes which largely resemble those of senile degeneration. It is evident from this that senility, whether physiological or premature, bears a relationship to hypofunctioning of the genital glands. In the testes of old animals and senile men there is a marked and distinct diminution of the cells of Leydig, both in number and size. There are evident signs of atrophy, as shown by the profusion of pigment in the cytoplasm and the absence of other enclosures.

Ancel and Bouin,² 1903, state that there is a hypertrophy of the Leydig tissue during disease, and that in prolonged cachexia it becomes atrophied. In experimental intoxication or infection they found that the Leydig cells hypertrophied at the beginning of the illness, but finally and in severe illness the tissue became greatly atrophied. They regarded this tendency to hypertrophy as a protective measure on the part of the interstitial cells. Voinov,⁴³ 1905, also regarded this increase of the number of cells of Leydig as a protective action on the part of the genital glands. Von Hansemann,²⁰ 1895, believed that the cells of Leydig were directly concerned in the production of testicular

tumors. It seems entirely possible that a tissue so liable to change under various conditions might easily hypertrophy to the extent of tumor masses in the testicles. According to Dürck's,¹³ 1907, and other observations, hyperplasia and hypertrophy of Leydig's cells are always accompaniments of both imperfect development and secondary atrophy of the seminiferous tubules.

Although conclusions drawn from pathological sources up to this time are not sufficient to explain the evident relationship of this tissue with other parts of the body, yet it may be said that there do exist in the testis, outside of the seminiferous tissue, other elements which are capable in themselves of carrying on the formation of sexual characters and virility. The fact that section of the nerves to the testis causes atrophy of the cells of Leydig without definite results upon the spermatogenic tissue, giving typical castrate characters in the individual, indicates the dependence of the secondary sexual characters upon the interstitial cells. The simple functioning of the generative tissue is not enough to insure against development of castrate or eunuchoid characters.

THE INTERSTITIAL CELLS AND CRYPTORCHIDISM.

The reader is referred to the work of Dr. A. G. Pohlman⁵⁰ for an excellent paper which deals with the probable causes of cryptorchidism.

The effects of undescended testes upon the body have received much attention of late. The clinical pictures of such individuals compared with microscopic findings in the testes has established a series of rather definite relationships of these glands to the somatic development of the body. Thus, Eccles¹⁴ divides the cases of undescended testes into four groups and relates the bodily effects attending each:

1. Arrest of one testis, with complete descent and growth of the opposite gland, is only very rarely associated with any deficiency in bodily growth.
2. Arrest of both testes, when they are ill-developed, is usually accompanied by some want of development of the body as a whole.
3. Arrest of both testes and good development of both glands is but rarely followed by or connected with imperfect development of the body.
4. Arrest of both testes, with arrest of development of only one of the organs, is not necessarily accompanied by a diminution of the bodily growth.

Double arrest with associated want of development, as a rule, means absolute sterility on the part of the individual, although he may at the same time be perfectly virile. In such cases the spermatozoa-producing functions of the gland is in abeyance, yet the formation of an internal secretion enables the person to gain the manly characters, while, if no internal secretion should be found, possibly owing to the absence of the interstitial cells, the person will ever remain in a puerile condition.

This interstitial tissue is found during normal life, sometimes in the fetus or young infants, and also when the gland is about to undergo its further development at, or just prior to, the onset of puberty. The fact that they are present so uniformly and in proportionately such large numbers in the imperfectly descended testes may point to the conclusion that they are peculiarly necessary for this purpose in the absence of spermatozoa producing cells.

Félizet and Branca¹⁵ have demonstrated that cryptorchidism in men possessing feminine secondary characters show complete sclerosis of the testicles. The cells of Leydig are also reduced to a few scattering and scanty groups. Cryptorchid pigs show considerable difference in the secondary sex signs, sexual instincts, and especially in the development of the genital tract, which depends on the variation in the weight of the testicles and which results from the different degrees of development of the cells of Leydig present. Bouin and

Ancel⁹ assert that cryptorchid animals stand midway between castrated and normal individuals in regard to the genital glands, sexual instincts, and somatic characters. As a rule, there is insufficient development of the Leydig cells; consequently the place held between the two extremes is determined by the degree of insufficiency. The same authors report observation on three cryptorchid pigs whose testicles had remained at a primitive stage of development. The cells of Sertoli were absent, while the cells of Leydig were well developed. The animals were typically males in appearance and the genital tracts were fully developed.

We find, therefore, in a great number of cryptorchid testicles there is not only malplacement, but also histological changes which show complete abeyance of spermatogenesis. It is well known that bilateral cryptorchid animals are sterile; also equally well known that these individuals possess normal or even excessive sexual instincts, and that all the male characteristics are well developed. When the cryptorchidism, is unilateral, the removal of the normal testicle renders the animal sterile, but it retains its male appearance and habit. Cryptorchid men invariably show normal development of the external genitals and male secondary sex signs.

Corner,¹¹ 1904, states that observations on cryptorchid individuals point definitely to the interstitial tissue as the seat of the internal secretion of the testicle.

Hanes¹⁸ has given us an excellent paper on the interstitial cells based on the study of 56 cryptorchid testes from the pig, 7 from sheep, and 6 from men. "Sections from the cryptorchid pig testicle reveal a truly remarkable picture, due to the excessive number of Leydig cells present. One observes that, whereas in the normal organ the spermatatic tubules greatly predominate over the interstitial cells, in the cryptorchid testicle the reverse is true. The interstitial cells of the cryptorchid testis are usually larger than those of the normal, but otherwise their histological structure is the same. The seminiferous tubules, on the contrary, present marked abnormalities. The basement membrane of the tubule is thickened, and it is lined only by a single layer of Sertoli cells. *No trace whatsoever of sperm-forming cells can be found in the adult cryptorchid testicle.* In very young cryptorchids large clear primary sperm cells are seen, but they apparently do not develop further, and soon disappear."

"If one compares, now, the external genitalia of normal castrated and cryptorchid pigs, one finds that, whereas the genitalia of the castrated animals are markedly undeveloped and atrophic in appearance, no distinction whatever can be made between the genitalia of normal and cryptorchid animals. Since, then, in the absence of the sperm-forming cells secondary sexual characters develop quite normally, one may safely eliminate these cells from the problem of determining which element of the testicle furnishes an internal secretion to the organism."

Up to the present time, however, it has not been found possible to cause an absence of a third type of cells—i. e., Sertoli cells. These cells remain intact after ligation of the vas deferens, in cryptorchids, and even in transplanted testicular tissue. Hanes argues for the interstitial cells as the tissue which elaborates the testicular hormone because of the following reasons:

1. The interstitial cells stand in the closest possible relation to the rich capillary meshwork of the testicle; they surround the capillaries in their course to the tubules, and are bathed in the large intertubular lymph spaces.

2. If the Sertoli cells really function as producers of an internal secretion, one would certainly expect to find evidence of their increase in monorchid testes, as well as in animals possessing only one scrotal testis, especially in

view of the striking augmentation of the interstitial cells under these conditions.

3. "If seminal tubules in various stages of spermatogenesis are stained for fat, it will be seen that, as spermatogenesis proceeds the large fat droplets which are present in the basal portion of the Sertoli cells in the beginning divide into very much smaller droplets, and pass centralward in the protoplasmic prolongations of the Sertoli cells, and thence into the spermatids after their union with the Sertoli cells. During its migration the fat can be shown by appropriate staining methods to have changed in its chemical character from a neutral fat to a lipid. Using Weigert's method for staining of myelin, Regaud³⁶ (1910) has also demonstrated lipoids in the Sertoli cells and spermatids. In cryptorchid testes it has been pointed out that sperm-forming tissues have completely disappeared. If the fat of the Sertoli cells is destined for the nutriment of the spermatids and sperm, the absence from the seminal tubules of these elements should result in the presence of an excessive amount of fat in the Sertoli cells. That such is strikingly the case will be seen from a section of the cryptorchid testis stained to demonstrate fat. The Sertoli cells are seen to be loaded with large neutral-fat droplets. On chemical analysis of normal and cryptorchid testes the microchemical findings are corroborated. Of the dried weight of normal pig testes, 19 percent was found to be fatty material, whereas the percentage of fatty substance present in cryptorchid testes was found to amount to 31 percent of their dried weight. In other words, the fat content of the cryptorchid testicle is almost double that of the normal. We conclude, therefore, that fat accumulates in the Sertoli cells of the cryptorchid testis because of the absence of the spermatogenic cells which normally utilizes this fat. One of the functions, therefore, of the Sertoli cells is to supply nutrient material to the spermatogenic cells." One is not, however, absolutely certain that the Sertoli cells do not furnish in addition to their nutritive actions an internal secretion. "There is no evidence whatever that they elaborate an internal secretion, whereas an abundance of facts point to their function solely as sperm-nourishing cells. The Sertoli cells seem to take no part in the production of an internal secretion."

THE INTERSTITIAL CELLS AND THE ACTION OF THE X-RAY.

The selective action of the x-ray affords additional proof that the interstitial cells are responsible for the internal secretion of the testes.

In 1903 Albers-Schönberg¹ demonstrated that the roentgen rays exercised a profound deleterious effect upon the male genital glands. He found that the cells of Leydig and the cells of Sertoli remain, along with the nerve and vessels, in a normal condition after exposure to the x-rays. He published the results of experiments on animals showing that exposure of the testicles to the x-ray for certain periods causes azoospermia through the arrest of the spermatogenic function of the testes. He exposed 5 male rabbits and 6 male guinea pigs to the rays for total periods of 195 to 377 minutes, divided into sittings of 15 to 40 minutes each at intervals of 7 to 27 days. All of these males were then given ample opportunity to copulate with unexposed females for periods of several weeks. Although these males showed the sexual desires and potency usual to their species, not a single female became pregnant. Eight of these males were killed and their sex organs examined. In one, which had received the least exposure, a few spermatozoa were demonstrated. In the remaining 7 no evidence of spermatozoa formation was found. Three of the males failed to impregnate females during several months after cessation of the exposures.

Simmonds,³⁹ 1907, and Herxheimer and Hoffmann,²² 1908, demonstrated that

the x-rays, while destroying the germ cells, failed to alter the interstitial cells and cells of Sertoli. Tandler and Gross, 1908, demonstrated the differences between the two tissues of the testis. They subjected roebucks with perfectly developed secondary sex characters to the action of the x-rays and found that after various degrees of treatment the antlers remained perfectly normal. After castration the animal loses the antlers. Here the interstitial cells maintained the integrity of the secondary sexual characters, notwithstanding the absence of spermatic tissue.

Simmonds,³⁹ 1910, from his work on the effects of the x-rays demonstrated that, even after prolonged exposure, isolated seminiferous tubules remained intact. He further noted that if the animals lived long enough, regeneration of the sperm cells took place and spermatogenesis resulted. Destruction of the spermatic cells is invariably accompanied by proliferation of the cells of Leydig, which again disappear after regeneration of the spermatic cells.

Philipp³⁴ reports the effects of the x-ray upon human subjects. In one case the testes were exposed 10 to 15 minutes daily for 30 days, a total exposure of 365 minutes. At the end of the treatment the semen contained the normal number of mobile spermatozoa. The second patient was treated for pruritus ani, receiving 145 minutes exposure in 20 days. Seven months later the semen contained no spermatozoa. Brown¹⁰ reports that every one of 18 manipulators of x-ray generators for several years past, whose semen he examined, showed complete or almost complete absence of spermatozoa. The subjects were men of robust health, ranging in age from 22 to 40 years. Not one of them had observed any marks of impotence. Half of them were married men, and none of these had begotten a child since beginning x-ray work. The testes seemed normal in size and consistence; the semen rather abundant, but in all cases examined after long exposure to the x-rays it contained no spermatozoa. Bergoigne and Tribondeau⁵ observed absence of spermatozoa after treatment by the x-rays. They report as the result of histological study of the testis so treated that "the seminal epithelium incloses two kinds of cells specialized in function, one forming the spermatozoa, while the other assured the nutrition of the first." It is the former cells that are destroyed by the x-ray.

It will be noticed in all the cases mentioned that the loss of the sperm-producing tissues does not cause the loss of sexual desires or secondary sexual characters. Here again the results of the observations point to the interstitial cells as the seat of internal secretory activity.

VASECTOMY AND THE INTERSTITIAL CELLS OF THE TESTES.

Many facts demonstrating that the cells of Leydig give rise to the internal secretion are to be derived from the results of vasectomy and ligation of the ductus deferens of the testes.

With the ligation of the vas, spermatogenesis ceases, spermatocytes and later the spermatogonia degenerate and at the end of a few months disappear entirely. At first there is no apparent change in the cells of Sertoli of the seminiferous tubules. The cells of Leydig retain their morphological integrity, and no change is wrought in sexual instinct, nor in the development of the secondary signs of sex.

The operations of vasectomy made by veterinary surgeons upon male horses in place of gonadectomy do not give the results of castration; instead the animal retains all the characteristics of the stallion. Similar results have been obtained in cryptorchid animals in which, in place of the testicles, the enormously developed epididymis was removed.

Griffiths,¹⁷ 1895, states that ligation of the vas in very young animals does not at first inhibit subsequent spermatogenesis. The first results are observed

as secondary consequences at puberty, when formation of semen normally takes place.

Mancaire,³⁰ 1902, grafted an atrophic testicle upon its sound mate in nine cases. In eight, all of which were adults, distinct regeneration of the wasted organ occurred and gave evidence of increased bulk and consistency.

In discussing conservative operations upon the testicles, Pascale³² gives the results of operations upon animals and four men. He demonstrated that the testis, deprived of its epididymis and vas deferens and joined to its fellow by removal of the testicular septum, retained its integrity and the patient benefited from its internal secretion.

According to Bouin and Ancel,⁹ 1903, ligation of the vas in horses and other animals causes the spermatic tissue to lose its functioning power and gradually to undergo degeneration. The cells of Leydig, however, remain unaffected and show a distinct glandular appearance. They suffice for the development of the secondary sexual characteristics. These investigators conclude that the testis is an organ which forms an internal secretion elaborated by the interstitial cells or, as they call them, interstitial glands, and not by the spermatogenic tissue. The same authors performed unilateral castration with ligation of the vas on the opposite side. About 6 months after operation the testicle left *in situ* appeared to be very much smaller. The seminiferous tubules contained a few spermatogonia; Sertoli's cells were unchanged. The "interstitial gland" was enormously developed and gave signs of secretory hypertrophy. At the end of 10 to 12 months the seminiferous tubules had become very much shriveled. The cells of Sertoli were degenerated, and the entire testis was made up almost exclusively of extremely hyperplastic cells of Leydig.

Shattock and Seligmann,³⁸ 1904, occluded the vasa deferentia in Hertwick rams and in fowls. These animals acquired all the secondary sexual characteristics. Tournade⁴² pointed out that long continued ligation of the vas in rats leads ultimately to destruction of the Sertoli cells.

Bouin and Ancel,⁹ 1906, working upon guinea pigs, found that the subcutaneous injection of extracts prepared from the interstitial tissue of the testes arrested the effects which castration would otherwise produce upon the remainder of the generative systems and skeleton. The same authors found that ligation of the spermatic cord at 7 to 8 weeks caused the animals to develop the behavior and habits of castrated animals. Microscopic examination showed atrophy of the testes both in the generative cells and the cells of Leydig. The latter were few in number and in appearance, reduced in size; they gave no signs of secretory activity, but contained a large amount of pigment granules. These findings caused them to believe that the difference in the condition of animals after ligation of the vas deferens in early youth is dependent on whether the efferent duct alone of the testicle is ligated or whether the nerves which supply the testicles are also included.

Resection of the nerves contained in the spermatic cord, without ligation of the vas, may lead to atrophy of the cells of Leydig. If only the spermatic duct is ligated, or if the resected nerves grow together again, the lesion of the internal secretory tissue elements is either very slight or quite transitory (Biedl,⁷ 1913).

Duménil¹² in a doctorate thesis gives the results of sectioning various structures of the spermatic cord. They are as follows:

1. Ligation or section of one of the arteries of a normal organ will not determine atrophy of the testis.
2. Ligation or excision of the veins of the cord is not followed by atrophy of the sound organ.
3. Section of the nerve causes atrophy in the organs which it enervates.

4. The simultaneous ligation or section of the arteries and veins produces atrophy of the organs.

5. *Ligation or section of the excretory duct of one gland determines atrophy in that organ. The ligation of the vas deferens determines atrophy of the seminal glands, but permits the integrity of the interstitial tissue.*

6. Complete ligation of all the elements of the cord is followed by atrophy and other pathological conditions.

Paton,³³ 1907, in discussing the relations between castration and sexual characteristics, says: "That it is not the tubules of the testis, but some product of the interstitial cells, which act in this way is demonstrated by the fact that ligation of the vasa deferentia, which causes atrophy of the tubules, does not prevent the development of the sexual characters."

Vincent and Copeman, working independently, have shown that complete suppression of internal and external secretion of the testicle is only to be effected by ligation of the entire spermatic cord. Simple ligation of the vas destroys only the generative tissue.

From these observations it is evident that the development and maintenance of the secondary sexual characteristics are not dependent on the functioning of the seminiferous tubules or the germ plasm, but on the interstitial tissue in the testes.

SUMMARY AND CONCLUSIONS.

1. It has been shown that the cells of Leydig act as secretory cells and that pathological conditions alter their normal activity.

2. The observations on cryptorchid individuals demonstrate that the development of secondary sexual characters is independent of the presence of functioning spermatic tissue. The selective action of the x-ray gave further evidence of the same fact.

3. The effects of vasectomy upon the somatic characters have been shown to be negative, the presence of the interstitial cells being sufficient to produce all the secondary characteristics of maleness.

It seems evident that the presence or absence of Sertoli's cells and spermatic cells does not affect the secondary sex characters, and that the internal secretory function is the sole property of the interstitial cells. This tissue not only exercises a protective influence, but it determines the appearance of the somatic male characteristics.

The behavior of Leydig's cells during the embryonal period and at other times of development point to the same conclusion. The first appearance of Leydig's cells in the embryo precedes the sexual differentiation of the primordial genital cells. The structure of the former indicates an exceptional degree of activity during embryonal life. The normal development of the secondary characters in the course of post-natal existence can be ascribed only to the function of this tissue. From birth to about the beginning of puberty, at the time when somatic sexual divergence is least clearly marked, the interstitial cells undergo the minimum relative development.

These cells of Leydig, although of mesodermal origin, are able actively to produce certain specific substances in the blood stream; such being the case, Bouin and Ancel⁹ felt justified in calling them, in their totality, "*an interstitial gland.*"

From the evidence set forth we may conclude with Corner,¹¹ "that a man's male plumage is in direct proportion to the weight or amount and activity of testicular (interstitial) tissue present."

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THE TONSIL PROBLEM IN CHILDREN.

By LOUIS K. GUGGENHEIM, M.D., of the Editorial Staff.

If there is any one problem more than another on which laryngologists disagree with the remainder of the profession and with each other, it is the tonsil problem in children. The pediatricist argues that the laryngologist does not see the little patients for more than a few weeks following tonsillectomy, and is therefore no judge as to the ultimate effect of tonsillectomy. The laryngologist argues that it is his particular field, and therefore he is the best judge of whether the tonsils should be removed. The consensus of opinion is that, in all probability, the tonsils protect the organism from bacterial invasion, and that when they themselves become diseased they are a menace to the rest of the body. The question arises, at what age do the tonsils cease to exert this protective influence and under what conditions should they be removed even under this age limit.

John Zahorsky¹ reports 100 consecutive cases of children brought to his office for various complaints. The children were seen one to four years after the operation for removal of tonsils and adenoids. A large percent (25 percent) showed nasal obstruction due to a hypertrophy of the nasal mucous membrane, which he ascribed to an interference with the lymph circulation. In the young children suppurative rhinitis was very common following the removal of the adenoids. In fully 60 percent of the cases the removal of the tonsils increased the tendency to bronchitis and bronchopneumonia. The young child who has repeated attacks of tonsillitis shows a predisposition to respiratory infections, which is not removed by tonsillectomy, some other part of the respiratory tract being compelled to take up the immunizing process. The tonsils must be considered lymphatic nodes, which receive their infection from the mucous membrane of the posterior nares and pharynx. They are the great immunizing agents in young children, and reach their height of development at 6 or 7 years; after this time the child becomes relatively immune to respiratory infections. Zahorsky argues that the tonsils should not be removed until the pediatricist has decided that the tonsils are no longer needed for this immunizing process. Removal of the tonsils often favorably affects the nutrition of the child; but this is usually temporary. Asthma is not benefited by the removal of the tonsils. Rheumatism, endocarditis, and chorea may occur after the tonsils are out. A strong protest is made against the removal of the tonsils until the child is 8 years old. Adenoids should be removed only when they permanently obstruct the nose.

Richard W. Perry² takes the unique stand that tonsils are pathological tissue, and that, having dignified this diseased tissue into an organ, the profession strives to invent imaginary functions for it. He believes that the tonsil was once completely inclosed by its capsule, and so protected from infection that during the process of evolution the pillars of the fauces separated, and with them the capsule of the tonsil. Nature performs the tonsil operation in that the glandular tissue is slowly replaced by connective tissue as a result of repeated infections and atrophy of the glandular elements. The author enumerates the different diseases which gain an entry into the body through the tonsils, and believes that the physician who advises the removal of the tonsil only when he finds it diseased is hopelessly out of date. He says in connection with the various functions ascribed to the tonsil: "There is no

direct evidence that it has any function, and, if we would use our microscopes more and our imagination less, we never would look for the gland to have a function beyond that of any ordinary lymphatic gland." In conclusion, he goes on record as advising the removal of every tonsil at 4 years of age, irrespective of its condition, or as much younger as infection may indicate. Having presented this astonishingly radical view of the problem, let us turn to a more conservative one.

G. W. Boot³ writes that tonsillectomy has become so popular that it is recommended for all sorts of conditions; that everyone is performing the operation, and that many times it is done not only with no advantage to the patient, but even to his positive detriment, this being particularly true in the case of children. The author adds that until the function of the tonsil is more definitely determined we shall not be able to decide as sharply as we would like just which tonsils should be removed and which should not. Concerning tonsillar function he states that there is no doubt of the fact that the tonsils are more active in childhood than in later life, and that, if the tonsil is normal at the age of puberty, it becomes so largely fibrous that in adult life it is of little or no importance. The younger the child, the more active the tonsil, and the more we should hesitate about advising tonsillectomy. Where no cheesy plugs or pus can be found in the crypts the child should always be put on the syrup ferri iodidi for several weeks to see if the tonsils can be reduced before tonsillectomy is resorted to. Aside from robbing the child of whatever function the tonsils may have, there is the question of deformity to be considered, with the possibility of rhinolalia aperta, difficulty in swallowing, etc.; also the question of bleeding and lung abscess. No effect upon the sexual development of the child has been noticed after tonsillectomy. Habitual colds have not been influenced except in cases of very large or plainly infected tonsils. In cases of tuberculosis of the cervical glands it is a mistake not to remove the tonsils. Tuberculosis of these glands seems to be on the decrease since tonsillectomy has become popular. In chronic tubal occlusion the tonsils are usually as much at fault as the adenoids. Many cases of chronic middle-ear suppuration are favorably influenced by tonsillectomy. Acute middle-ear suppuration may follow the operation. In nephritis and endocarditis complicating a streptococcus infection of the throat, tonsillectomy should be performed after the acute symptoms have subsided. In rheumatism the tonsils should be removed if infected, or even when apparently not infected, if no other cause can be found for the condition. Otosclerosis will probably occur less frequently as a result of the numerous tonsillectomies. Plenty lymphatic tissue remains in the throat after tonsillectomy and adenoidectomy, and this tissue shows compensatory hypertrophy following the operation in childhood. Post-operative pneumonia and lung abscess are due to deep anesthesia and to improper position of the head, resulting in inhalation of infectious material. Peritonsillar abscess and tonsillar abscess justify tonsillectomy after the acute condition has subsided. Children who have had tonsillectomy performed are less susceptible to the infections of scarlet fever and diphtheria.

George E. Shambaugh⁴ states that the general practitioner as well as the throat specialist has only recently begun to appreciate the serious systematic conditions which owe their origin to infected tonsils, and that with the development of this knowledge there has naturally arisen a demand for effective methods of treating infected tonsils. The older methods, such as slitting the tonsil pockets and cauterizing the tonsils, were so often unsatisfactory that we were frequently inclined to leave the tonsils entirely alone rather than attempt this treatment. It has been only since we have learned that tonsils in adults can be safely enucleated that we have found a satisfactory method of handling tonsil trouble. He then adds that because of the so-called "massacre"

of tonsils, especially in children, we are especially anxious that the proper medications be recognized before the tonsils are removed. He emphasizes the fact that, aside from cases showing frank involvement of the tonsils with plain indication for operation, the laryngologist must co-operate with the internist if he desires to avoid unnecessary surgical procedures.

Joseph C. Beck⁵ writes, in connection with indications for tonsillectomy in children and adults, that, with few exceptions, every tonsil is better out than in. Contraindications are (1) all acute inflammations; (2) luetic, particularly ulcerative processes; (3) advanced tuberculosis; (4) advanced cardiovascular changes and constitutional diseases where the anemia is very marked; (5) advanced cases of diabetes mellitus; (6) low coagulating power of the blood, as in true hemophilia, etc.; (7) blood pressure over 225 systolic; (8) infants below 1 year of age; (9) grave mental diseases in which marked excitation is present. Among other undesirable after-effects he mentions symptoms resembling those of cretinism and marasmus in infants up to the third year.

Ernest M. Seydell⁶ writes that, since it has been shown, in recent reports of Mathess, Nuzum, and Rosenow, that in a number of cases of poliomyelitis the same organism found in the spinal fluid and tissues of the brain and cord has also been demonstrated in the tonsils of the same cases, the question arises, "are the tonsils the portals of infection?" In 203 cases of poliomyelitis studied the writer and Dr. Myer found tonsils present in 200 cases. In three cases there was a partial absence of these structures, and in these cases the paralyzes were slight and recovery rapid.

Rosenow⁷ stated that the tonsils in patients suffering with poliomyelitis, especially those over 3 to 4 years of age, yield on pressure a surprisingly large amount of infectious material even where no objective symptoms of tonsillitis are present. These tonsils present numerous areas of localized necrosis, usually along the capsule and not communicating with the surface. They contain a peculiar opalescent material in which are found large numbers of the micrococci. These have also been found in the adenoids. In about twenty-five cases in which the temperature remained high and the paralysis was progressing, tonsillectomy was performed. Following operation the temperature abated and convalescence was rapid. Rosenow reports two cases that developed poliomyelitis in whom tonsils and adenoids had been presumably properly removed. In one there was only a slight weakness of the shoulder muscles, which disappeared promptly. In the other case the paralysis was slight, even though a brother of the patient, whose tonsils had not been removed, was severely paralyzed.

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DEPARTMENT OF PATHOLOGICAL ANATOMY.

By DOUGLAS SYMMERS, M.D.,

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Primary Progressive Pernicious Anemia and Aplastic Anemia.

Primary progressive pernicious anemia was first described by Addison as a process which "makes its approach in so slow and insidious a manner that the patient can hardly fix a date to the earliest feeling of languor which is shortly to become so extreme." It is essentially a disease of adult life, occurring oftenest between the third and sixth decades, and is about equally distributed among males and females. Of 20 cases investigated post mortem at Bellevue Hospital in the past 11 years, 11 occurred in males and 9 in females. The ages were as follows:

20-30 years.....	2
31-40 years.....	5
41-50 years.....	4
51-60 years.....	8
71 years.....	1

The cause of pernicious anemia of the Addison type is not known. One view is that the disease is due to hemolytic substances of intestinal or infective origin. Bunting has shown, for example, that a disease closely akin to pernicious anemia may be produced experimentally in animals by the repeated injection of small doses of ricin, which is a hemolytic poison, while Schaumann and others have demonstrated hemolytic substances in the segments of *bothriocephalus latus*, an intestinal parasite whose presence in the human body frequently is associated with an anemia of the pernicious type. Moreover, from the intestinal mucosa of persons dead of primary progressive pernicious anemia lipid bodies have been extracted which, when injected into animals, produce intense anemia.

One of the most striking features of pernicious anemia is to be found in the occurrence of pallor or a peculiar lemon-yellow color of the skin, usually in association with preservation of the fats throughout the body. In the Bellevue Hospital cases 14 (70 percent) of the patients were well nourished as far as the fat tissues were concerned, and 6 were poorly nourished, while in 14 instances (70 percent) the skin was diffusely lemon-yellow in color and, in 4, pallor of the skin and visible mucous membranes was noted. In 12 cases (60 percent) the subcutaneous and other fatty tissues were also bright yellow, and in 7 of these subjects the muscles were unusually red—a fact which frequently has been noted in the post mortem investigation of pernicious anemia. The cause of the yellowish discoloration is not known, but is probably due to the presence of a lipochrome, a suggestion which is based on the fact that, in pernicious anemia, disturbances in certain of the pigments of the body occur with great frequency.

The blood in pernicious anemia is thin and its specific gravity is lowered, a finding which is of interest in connection with the occurrence of petechiae in various localities. The liability to hemorrhage is a noteworthy feature in pernicious anemia, although only rarely does it assume serious propor-

tions. In the retinae, where petechiae are perhaps most commonly observed, they have been known to cause impairment of vision varying in degree from distortion of images to blindness. The hemorrhagic tendency is furthermore of importance in that relatively slight operations, such as the withdrawal of a tooth or simple incision of the skin, may be followed by persistent, even dangerous oozing. In the Bellevue Hospital cases minute hemorrhages were encountered in the pericardium 3 times, in the stomach 3 times, in the dura twice, in the heart muscle, the mucosa of the bladder, the interstitial tissues of the testicle, the endocardium, peritoneum, pleura and skin once each, and in the liver twice. The number varied in different cases from a few to dozens or even hundreds. In one case the conjunctivae and skin were peppered with small hemorrhagic extravasations to such an extent as to simulate purpura. In two cases there were well marked signs of acute hemorrhagic internal pachymeningitis, petechiae being found in company with large extravasations of freshly clotted blood and with diffuse brownish pigmentation of the dura, the latter indicating the deposition of pigment from previous hemorrhage. In a case of aplastic anemia there was an organizing blood clot in the interpeduncular spaces attended by a clinical history of repeated attacks of headache and vertigo.

Edema is a frequent occurrence in pernicious anemia, and, like the presence of petechiae, is probably due, in a measure at least, to changes in the blood that permit the serum easily to escape into the surrounding tissues. In the Bellevue Hospital cases pretibial edema occurred 4 times, and the mediastinal, perilyngeal, subcutaneous and mesenteric tissues were infiltrated twice each. In 9 cases (45 percent) the pericardium and pleurae each contained a noticeable excess of fluid, and in 19 cases (95 percent) the lungs were edematous. The occurrence of pulmonary edema is probably due partly to increased filterability of the blood and partly to changes in the circulation brought about by fatty transformation of the heart muscle, and is the most frequent cause of death, the patient literally drowning in his own secretions. It is to be assumed that the fatty transformation of the left ventricle so interferes with the heart's rhythm as to cause disproportionate activity between the two sides, thus favoring the escape of fluid into the lungs in the same way and for the same reason that edema of the lungs occurs in experimental compression of the left ventricle, as shown by Welch.

Fatty changes in the heart muscle occurred 18 times (90 percent) in the Bellevue Hospital autopsies. It is most exquisitely illustrated by the papillary muscles in the left ventricle, which present numerous yellowish striations the appearance of which has been likened to that of the striping of the tiger's skin, but it may involve a more extensive territory. Microscopically, the fat may be demonstrated as scattered foci lying in the individual muscle fibres, replacing the contractile substance to a greater or less extent.

The liver likewise is frequently involved by fatty changes, having been noted 18 times (90 percent) in the Bellevue cases. Fatty change in the convoluted tubules of the kidney was found 6 times (30 percent).

The pathology of pernicious anemia frequently is marked by pigmentary alterations in the form of iron deposits seen most often in the liver, but occasionally encountered elsewhere. In the Bellevue series the liver was definitely brownish in color 12 times (60 percent), due to the deposition of iron-containing pigment in the parenchyma cells, the heart was involved twice, and the kidneys and pancreas once each. The amount of pigment in these circumstances is usually regarded as an index of the degree of hemolysis.

The spleen is sometimes noticeably enlarged in pernicious anemia, at other times no change in size is apparent. In the Bellevue Hospital cases the spleen was enlarged 7 times (35 percent), the individual weights being 860,

700, 475, 330, 350, 260 and 860 grams, an average of 543 grams, or 343 grams in excess of the extreme normal weight. The enlargement seems to be due mainly to changes in the pulp, excessive numbers of red cells appearing in the sinuses, many of the corpuscles showing signs of disintegration, some within the bodies of phagocytes, others lying free. Interesting in this connection are the changes in the so-called hemolymph nodes. In the Bellevue cases the hemolymph nodes in the abdominal cavity were distinctly enlarged 6 times (30 percent), appearing as cherry red bodies lying in the mesenteric and retroperitoneal fat. Microscopic examination of the hemolymph nodes shows the presence of innumerable red cells resting in the sinuses, where many of them, like those in the spleen, are to be found within phagocytes, others lying free as shadow corpuscles.

Atrophy of the gastric mucosa is a not infrequent finding in pernicious anemia. In fact, it has been mentioned as a cause of the disease, a view which, however, is no longer seriously considered, the change probably representing a result rather than a cause. Its clinical significance is to be found in the fact that it is the underlying lesion which is responsible for the diminution of gastric juice so commonly observed in patients suffering from pernicious anemia. In the Bellevue Hospital cases chronic atrophic gastritis was present in marked degree 9 times (45 percent).

In a certain number of cases of pernicious anemia sclerosis of the posterior columns of the spinal cord is present. The lesion is attended by sensory disturbances and, at times, by ataxia. It occurred but twice in the Bellevue autopsies.

Pyorrhea alveolaris and related conditions are sometimes mentioned as a significant feature in the production of pernicious anemia, the absorption of toxic substances supposedly giving rise to hemolysis. Pyorrhea, which is encountered as an apparently secondary lesion in a number of conditions, was found twice in the Bellevue autopsies in pernicious anemia.

In the Bellevue autopsies it was noted that 12 subjects (60 percent) presented marked signs of pulmonary emphysema. Whether this is to be regarded as an accidental feature in pernicious anemia, or whether it is a part of the pathology of the disease, I do not know. The change is not mentioned in the literature of pernicious anemia with which I am acquainted. It is a notorious fact that sufferers from pernicious anemia are subject to dyspnea on the slightest exertion. It is possible that such efforts, imposed upon lung tissue already compromised by nutritional disturbances due to anemia and deficient heart action, are sufficient to bring about atrophic changes in the yellow elastic tissue with subsequent emphysematous dilatation of the air vesicles.

Perhaps the most striking and important individual feature in the pathology of pernicious anemia is to be found in the bone marrow, which is hyperplastic and presents color changes varying between complete reddish transformation and the occurrence of reddish foci at scattered intervals. Microscopic examination of smears from the marrow reveals innumerable erythroblastic cells, many of which are of the megaloblastic type, the whole representing a regenerative effort to compensate for the diminution in the number of circulating erythrocytes. The hyperplastic changes in the marrow accounts for the presence of nucleated red cells in the blood, which is the *sine qua non* of pernicious anemia of the Addison type. So constant is this finding that the condition of the bone marrow may oftentimes be accurately deduced from the number and character of the nucleated red cells in the blood. The occurrence of raspberry-red marrow is attended by the presence of innumerable nucleated red cells in the blood, the great majority consisting of megaloblasts, while fatty marrow interspersed with reddish islands of

erythrogenetic tissue discharges relatively few nucleated red cells into the blood and, of those present, few, if any, are of the megaloblastic type. These observations are of particular significance in connection with the disease described by Ehrlich, in 1888, as aplastic anemia, about whose relationship to pernicious anemia there has been a great deal of discussion. Aplastic anemia is characterized by a rapid course, death occurring in a few weeks or months, rarely after the lapse of a year, and the course is progressively downward, intermissions being unknown. The red cells are enormously reduced in number, the color index, unlike that of Addison's pernicious anemia, is often low, and nucleated red cells, if present at all, are usually of the type of normoblasts, megaloblasts being rarely seen. Autopsy reveals alterations identical with those of pernicious anemia with the notable exception that the bone marrow is yellowish or grayish-yellow in color without the slightest indication of erythrogenetic centers. In other words, the bone marrow is incapable of responding to regenerative demands, and in consequence of this the anemia rapidly progresses to a fatal termination. In pernicious anemia of the Addison type, however, the bone marrow still is capable of providing a certain number of red cells, many of which, it is true, are immature, nevertheless the response of the marrow is sufficient to tide the patient over a number of years and, at intervals, to cause almost complete disappearance of the anemia and temporary restoration to health. As far as the relationship between aplastic and primary progressive pernicious anemia is concerned, the question is apparently one of variation in the response of the body to the same cause. The clinical differences are explicable on this score and the prognosis is determined by the same factor.

Aplastic anemia is a rare disease, Lvenson having succeeded in collecting but 10 cases up to 1907. In the past 11 years 3 cases have been encountered at Bellevue Hospital among over 5,600 autopsies. The clinical and anatomical features are presented below:

CASE I.

The patient was a male, aged 36, who was admitted to the medical service of Dr. Van Horne Norrie, complaining of nausea and vomiting, aversion to food, and severe paroxysms of headache and vertigo. The first paroxysm occurred 20 days before the patient's entrance into the Hospital and lasted about 20 minutes. In the interim he had suffered similar attacks to the number of about fifteen, the more recent ones having left him weak and with progressively increasing pallor. Physical examination revealed a well nourished and yet markedly anemic subject. The breath was foul. There was a faint systolic murmur to the left of the ensiform cartilage. The skin of the anterior abdominal wall and of both lower extremities presented numbers of petechiae. The blood count showed 4,600 leucocytes and 1,280,000 red cells, among which were many poikilocytes, megalocytes and microcytes, but no nucleated red cells. The Hb. was 20 percent, the color index .5. The temperature varied between 98 and 101 degrees F. The patient was under observation 6 days only, and death supervened after an illness lasting, as far as could be learned from the statements of the patient, but 26 days. The patient, however, was inclined to date the commencement of his illness from the inception of the attacks of headache and vertigo, but these, as the autopsy showed, were undoubtedly due to hemorrhage into the interpeduncular spaces and Sylvian fissures, the extravasation probably taking place as a result of the profound changes in the composition of the blood. It is to be assumed, I think, that the entire duration of illness was considerably longer than the estimate of the patient.

Autopsy 1,049. The body was that of a well nourished man. The skin and mucous membranes were pale with a slight yellowish tinge. The adipose

tissues were abundant and bright yellow in color. The muscles were dark red. The parietal peritoneum was sprinkled with minute hemorrhages. The pericardium contained a moderate excess of clear fluid, and in the epicardium were numerous bright red petechiae. The heart muscle was flaccid, yellowish in color, and the endocardium of the left ventricle, particularly in the upper part, presented the typical tiger striped appearance. The visceral pleura showed numbers of petechiae, the lungs were edematous with scattered hemorrhagic foci, and the bronchi were bathed in frothy serum. The liver was slightly enlarged and its substance was yellowish brown in color, smooth and firm. The marrow of the ribs and vertebrae was pale, while that of the long bones showed complete fatty metamorphosis. Smears from the marrow of the ribs and vertebrae exhibited a few nucleated red cells. The pia mater was edematous and there were a few blotchy subpial hemorrhages scattered over the convexity. At the base of the brain in the interpeduncular spaces and around the vessels in the Sylvian fissures, was a partially organized blood clot.

Anatomical diagnosis: Aplastic anemia. Hypoplasia and fatty metamorphosis of bone marrow. Retention and yellowish discoloration of subcutaneous fat. Hemorrhagic petechiae in skin and serous membranes. Fatty metamorphosis of heart. Edema of lungs. Organizing blood clot at base of brain.

CASE II.

The patient was a woman, aged 46, who was admitted to the medical service of Dr. S. A. Brown. The patient stated that seven months before admission she gradually became subject to shortness of breath, chilly sensations, fever and attacks of syncope. More recently she noticed puffiness about the ankles and under the eyes. Physical examination showed a poorly nourished woman. The skin and visible mucous membranes were pale with a slightly yellowish tint. There was a soft, blowing systolic murmur over the aortic cartilage that was not transmitted. The blood showed 4,500 leucocytes, of which 74 percent were polynuclear neutrophiles, 8 percent transitional cells, 10 percent lymphocytes, .4 percent large mononuclear cells, 2 percent eosinophiles and 1 percent basophiles. The red cells numbered 848,000 and the color index was 1.4. Nucleated red cells were present and, of these, .2 percent were megaloblasts and the balance normoblasts.

Ophthalmoscopic examination showed multiple hemorrhages in both retinae.

Examination of the nervous system revealed anesthesia of the right side of the conjunctivae. The abdominal reflexes were sluggish. The elbow jerk on the left side was increased, the right sluggish. The patient exhibited inability to appreciate the difference between heat and cold in both lower extremities, and complained of a distinct girdle sensation.

The patient was under observation 6 months. Death occurred after an illness lasting, as far as could be determined, 13 months.

Autopsy 3,920. The body was that of a poorly nourished female. The skin and visible mucous membranes were pale. Both pleural cavities contained a marked excess of fluid. The lungs were compressed. The heart muscle was flabby and frequently striped in yellow. The liver was chocolate colored, brownish foci alternating with yellow, the substance was increased in consistence and the organ was practically bloodless. The spleen was large and weighed 500 grm. It was dark red in color, the trabeculae were prominent and the substance tough. The marrow of the long bones showed complete transformation into a translucent, wax-like substance. The spinal cord could not be removed.

CASE III.

The patient, a woman aged 38, was admitted to the gynecological service of Drs. Coe and Studdiford. The clinical history contained nothing of importance in the present connection except a complaint of persistent vomiting. Chemical examination of the gastric contents revealed complete absence of HCl. The skin and visible mucous membranes were pale with an icteroid tint. Blood examination showed 6,000 white cells, 2,240,000 red cells, 38 percent Hb., color index .7. The patient was under observation for 3 months, during which time vomiting was frequent, she became progressively weaker, and death occurred in coma.

Autopsy 1,331. The body was that of a rather poorly nourished female. The skin and visible mucous membranes were pale and slightly tinged with yellow. The fatty tissues throughout the body were of a lemon-yellow tint. The heart muscle was yellow and flabby. The liver was yellowish brown. The mucosa of the stomach showed no naked eye changes. The marrow of the femur was completely transformed into fat.

Addison's Disease.

The suprarenal capsule represents, developmentally, two sets of organs which, in higher forms, are fused, the cortex originating in the mesoderm and the medulla in the neuroectoderm. The cortex, which is of companion origin with the testicle in the male and the ovary in the female, is in some way connected with sexual activities. For example, there is a tumor of the adrenal cortex which, when it develops before the onset of puberty, brings about certain changes in bodily growth and in the development of the genitals and secondary characteristics that can be attributed only to interference with the normal function of the cortical cells. The medulla, on the contrary, is composed largely of nervous elements and of polymorphous cells which, when treated with chrome salts, take on a brownish appearance and are known as chromaffine cells. Identical cells are encountered in situations beyond the suprarenal capsule, mainly in the tissues along the course of the abdominal aorta—the so-called Zuckerhandl's paraganglia. The specific function of the suprarenal and other chromaffine cells is to furnish an internal secretion which maintains the vascular and muscle tone and controls the amount and distribution of certain pigment in the skin and mucous membranes. Interference with the function of the chromaffine system, particularly with those elements which reside in the suprarenal medulla, is followed by changes of profound importance, notably by a disease described by Addison, in 1885, and characterized by pigmentation of the skin and visible mucous membranes, and by profound asthenia of the skeletal and cardiac muscles. In other cases, however, it is possible for extensive changes to arise in both suprarenal capsules without Addison's disease. In these circumstances it is held that islands of functioning suprarenal tissue are still intact and, in addition, that the extra-capsular chromaffine cells are called upon to compensate for those lost by destruction of the suprarenals. Conversely, Addison's disease may arise without detectable changes in the suprarenal capsules, in which case it is argued that the extra-capsular chromaffine system is the seat of disturbance, the supply of chromaffine cells in the suprarenal bodies being inadequate to balance the loss.

Of over 5,600 autopsies at Bellevue Hospital destructive lesions of the suprarenal capsules were encountered 48 times. In 23 cases the lesion was unilateral, in 25 bilateral. The suprarenal capsules were the seat of tumor metastases in 23 instances. The secondary growths were derived from cancer

of the stomach 5 times, the breast 4 times, the gallbladder and liver twice each, the duodenum and splenic flexure once each, from an hypernephroma of the kidney once, and from sarcomata 6 times. Of this number both adrenals were extensively metastasised 12 times (52 percent), and, of these, the glands were apparently completely replaced in 8, or in 35 percent. In addition to destruction of the adrenal bodies by secondary growths, there were 3 cases of bilateral adrenal hypernephromatosis attended by complete transformation of the glands into tumor tissue. Of the other cases of destruction of the suprarenal capsules there was complete sclerosis of the left in one case with marked adenomatoid hyperplasia of the gland of the opposite side, in 2 cases of pyemia the left adrenal was the seat of abscess formation. There were 14 cases of tuberculous involvement of the adrenals, all of them associated with and apparently secondary to tuberculosis of other parts. Of the 14 cases there were caseous foci in the left adrenal 5 times and in the right once. In two cases the adrenals were the seat of miliary tubercles. In one instance the left adrenal was completely replaced by caseous material and in 2 the right was similarly destroyed. In three cases both adrenals were concerned to a marked extent, but in all of them islands of adrenal tissue were still to be distinguished. In 5 cases of sepsis in children both adrenals were extensively infiltrated by hemorrhage, death occurring very shortly thereafter. In other words, both suprarenal capsules were completely or almost completely destroyed in 18 long-standing cases (37.5 percent), and in not one of the number was pigmentation of the skin or of the mucous membranes observed at autopsy, nor was this or other sign of Addison's disease detected during life.

In the great majority of all cases of Addison's disease the suprarenal capsules are destroyed by tuberculous lesions, usually secondary to tuberculosis elsewhere. In rare cases other changes are responsible, such as destruction by tumor metastases, hemorrhage, gummata, etc. Four cases of Addison's disease have been investigated at autopsy in Bellevue Hospital in the past 11 years. Of these the clinical history in one case is not available. The other clinical histories together with the autopsy findings are synthesised below. The cases are much alike in certain particulars, nevertheless I think it advisable to present all of them, even at the risk of repeating clinical and anatomical essentials.

CASE I.

The patient, a woman, aged 27, was admitted in the medical service of Dr. Le Fevre. She stated that, 20 years before, she struck her back and, within a few weeks, began to experience pain in the injured region, but noticed no deformity. Three years later, following the birth of twins, the pain in the back reappeared with increased severity and a deformity of the spine became obvious.

One year before admission the patient noticed slight brownish discoloration of the face that became gradually more pronounced and finally involved the skin of the neck, arms, hands and feet. Similar but patchy discoloration occurred in the mucous membrane of the lips and cheeks. Coincidentally with the appearance of the first sign of pigmentation the patient became subject to marked weakness attended by loss of appetite amounting to actual aversion to food, vomiting, and constipation alternating with occasional attacks of diarrhea. The heart sounds were so distant as scarcely to be audible through the stethoscope. The blood showed 3,600,000 red cells and 60 percent Hb.

Autopsy 1,972. The body was that of a slender, emaciated woman. On opening the body the diaphragm was found to be adherent to the vertebral column through the medium of firm fibrous tissue and the corresponding

vertebrae in the lower thoracic region were composed of softened, caseous material. The skin of the face, neck, hands and forearms and that around the waist line and just below the knees was brownish in color. The mucosa of the lips and cheeks presented patches of brownish pigment. The skeletal muscles were pale. The heart was small, weighing but 155 grm. The muscle was brownish. The right adrenal was embedded in a mass of inflammatory tissue. The capsule measured 70x22x6 mm. and, on section, was completely replaced by caseous nodules. The left adrenal measured 55x25x10 mm. and was similarly destroyed. Not a vestige of glandular substance was evident in either organ. The sympathetic ganglia were dissected out and appeared as flattened, grayish bodies, measuring 2.5x1.5 c.m. Microscopic examination of the ganglia revealed no histological deviations from the normal.

The mucosa of the stomach and intestines presented no naked eye changes other than hyperplasia of the lymphoid follicles, a feature which was pronounced in both situations.

CASE II.

The patient, a man, aged 34, was admitted to the medical service of Dr. Hastings. He complained of loss of weight amounting to 25 lbs. in the three months previous to coming under observation. He stated, in addition, that, for 11 years previously, he had observed gradually deepening pigmentation of the skin of the whole body and that, latterly, he was growing weaker and his appetite was failing. Physical examination showed an emaciated man with diffuse bronzing of the skin and patches of darker pigment here and there. The mucosa of the mouth and lips was the seat of isolated collections of pigment and there was similar discoloration of the glans penis. The left hip was ankylosed and the extremity atrophied.

Autopsy 2,262. The body was that of a man, well nourished and muscular. The left lower extremity was several inches shorter than the right and was fixed at the hip and atrophied. The skin of the face and neck and the dorsum of the hands was dark brown in color, that of the trunk and abdomen dirty yellow. Over both extremities and the trunk, in front and behind, were numerous patches averaging nearly a centimeter in diameter that were dark brown in color. The inner portions of the lips and the mucosa of the mouth showed several blackish areas of pigmentation. On the skin of the penis and in the mucous membrane of the glans were a number of small brownish-black patches. The left adrenal measured 55x22x12 mm. and weighed 6.5 grm. On section it was found to be replaced by caseous material, no gland tissue being recognizable. The right adrenal measured 65x30x12 mm. and weighed 12 grm. Its normal contour was retained and, on section, it was likewise replaced by caseous material, only a rim of cortical tissue being visible. The semilunar ganglia on both sides were apparently larger than normal, but were otherwise unchanged. The head of the left femur was caseous. The stomach and intestines were normal except for the presence of hyperplastic lymphoid foci.

CASE III.

The patient, a woman, aged 39, was admitted to the medical service of Dr. Lambert. The patient stated that, five months before admission, she was suddenly seized with severe pain in the abdomen attended by loss of appetite, insomnia, extreme weakness and that she had lost 30 lbs. in weight. A month before admission weakness became so marked that she took to her bed. For three weeks previous to admission she vomited often and there were repeated attacks of hiccough. A month before admission the patient's husband called attention to pigmentation of the hands and feet. This became gradually darker and finally involved the skin of the face, neck, shoulders,

axillae and the waist line. Brownish deposits were evident in the mucous membrane of the lips and gums. Blood examination showed 57 percent Hb. The systolic blood pressure was 84, the artery compressible.

Autopsy 2,142. The body was that of a fairly well nourished woman. Autopsy was limited to an abdominal incision. The skin of the face and the back of the hands was diffusely brownish in color. The lips and gums were pigmented and the areolae of the nipples were blackish. The lungs were adherent to the parietes and showed apical caseous foci. The peribronchial lymph nodes were caseous. Both suprarenal capsules were practically entirely destroyed by necrotic tissue. The stomach and intestines showed hyperplastic lymphoid foci.

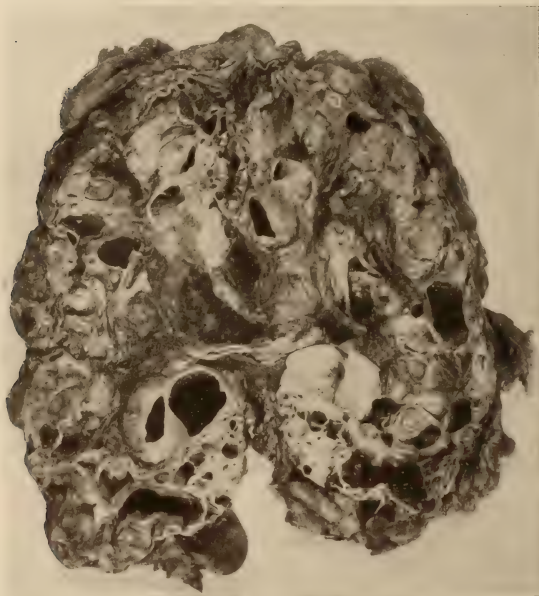
In addition to the facts presented above, autopsy in all four cases of Addison's disease revealed the changes in bodily configuration, the cardiovascular hypoplasia and the lymphoid hyperplasia characteristic of status lymphaticus, including enlargement of the follicles in the stomach and intestine. In the three cases a clinical synopsis of which is given above, it will be observed that the patients complained more or less of persistent vomiting, and yet autopsy revealed no changes in the stomach which could account for it. The lymphoid hyperplasia is not to be held responsible, since this is a frequent finding in subjects of status lymphaticus who, during life, have given no sign of gastric disturbance in the form of vomiting. It appears that vomiting in Addison's disease is due to a cause more subtle than that of organic change in the stomach.

The association of status lymphaticus with Addison's disease has often been observed. In fact, status lymphaticus is an almost constant accompaniment of several chronic diseases brought about by disturbances in the glands of internal secretion, including Grave's disease, akromegaly and akromegalic giantism, pituitary dystrophies and cretinism. In Addison's disease depending upon lesions of the suprarenal capsules, the association of status lymphaticus is of particular significance in connection with the observation of Norris and others, that status lymphaticus is practically always attended by extreme hypoplasia of the cortex of the suprarenal bodies, a developmental defect the occurrence of which we have so often had occasion to point out in the autopsy room as to leave no doubt that it is a part of the pathology of this remarkable combination of hereditary anomalies.

Congenital Polycystic Degeneration of the Kidneys.

The pathologist is not infrequently confronted by destructive changes in various important viscera of such an extent as to excite wonder that they could possibly be compatible with life, even for a short space, and yet there is every reason to believe that they have existed for a considerable length of time. The process appears to be one of gradual adaptation to changing conditions, nature having provided every important organ with reserve factors of safety which, if utilized by easy stages, are capable of wonderful elasticity. Thus there is not an experienced pathologist who has not seen almost complete replacement of the liver tissue by fat or amyloid. In these circumstances it is hardly possible that the comparatively few healthy cells that remain are capable of meeting all the diversified functional demands made upon the liver. It is to be assumed that these cells respond to their fullest capacity, but that their limitations are eventually transcended and that certain of their functions are necessarily transferred to other tissues, the muscles and pancreas probably taking over a certain number of them. One not infrequently sees extraordinary changes in the heart due to replacement of the muscle

substance by fat, inflammatory tissue, tumor cells and the like. For example, a case recently came to autopsy at Bellevue Hospital in which there was almost complete replacement of the left ventricle by lymphosarcoma cells. I have in mind, also, a case of syphilitic cirrhosis of the lungs in which enormous quantities of pulmonary tissue were destroyed, relatively few air spaces being detected either by the naked eye or microscopically. In the case of the brain it is equally astonishing to observe to what an enormous extent its substance may be destroyed by slowly growing tumors, collections of fluid in the ventricles, etc. Extensive destructive lesions in the kidney are frequently



Polycystic degeneration of kidney.

observed in the form of chronic interstitial nephritis with great reduction in volume, and experimental ablation of the kidney, if done slowly, may be carried out to a remarkable extent without producing death of the animal.

In the autopsy room at Bellevue Hospital we have just had occasion to investigate the body of a woman, 41 years of age, both of whose kidneys presented the changes usually described under the title of congenital polycystic degeneration. The naked eye and microscopic changes were such as to reveal almost complete destruction of the secreting substance.

Three theories have been advanced to account for the pathogenesis of the polycystic kidney, the inflammatory, the neoplastic and the embryonal. The inflammatory theory is accredited to Virchow, who suggested that the

condition is due to intrauterine papillitis resulting in obliteration of the convoluted tubules and the formation of retention cysts. This theory has been abandoned, largely for the reason that numerous cases investigated since have failed to show evidence of papillitis, and partly because the inflammatory theory does not account for the fact that the polycystic kidney so frequently is attended by congenital anomalies—absence of the bladder, double vagina, hypospadias, atresia of the ureter, hair-lip, spina bifida, etc.—as to make it impossible to disregard them as participants in the same vice of development.

The neoplastic theory accounts for the polycystic kidney as a multilocular adenocystoma, but the histological changes upon which this theory is based are likewise present in normal embryonal kidneys, a fact which serves, however, merely to depreciate the value of the theory as an individual working basis, rather than to destroy it altogether.

The theory of embryonal malformation receives the support of many investigators. It is founded upon the fact that the kidney is developed from two anlagen, one giving rise to the glomeruli and convoluted tubules, the other to the straight and collecting tubules. Failure of the two properly to unite, either as a result of inflammatory intervention or otherwise, permits cystic distension of the glomerular capsule and of the convoluted tubules.

In the case presented below it will be seen that the patient had attained the 41st year of life and that, at autopsy, both kidneys were found to be so riddled with cysts that scarcely a particle of secreting tissue remained. It is inconceivable that the kidneys had always been in this condition. The change must have been a progressive one, the cysts originating, no doubt, as a result of developmental defects, the subsequent expansion of the cysts causing compression atrophy of the parenchyma and death from failure of the renal function.

The patient was a woman, aged 41, married, the mother of two children. She was under observation for 5 days only, during which time she passed on an average of 25 c.c. of urine daily. She was weak, at times cyanotic, dyspneic and vomited often. The specific gravity of the urine was 1,005, there was a trace of albumin, many pus cells, but no casts. The phenolphthalein test was negative, not a trace of the drug being excreted. The blood pressure was $\frac{125}{80}$. Otherwise the clinical history contained nothing of interest in the present connection.

Autopsy 5,619. The body was that of an emaciated woman. The skin was smooth and pale. Masses of considerable size were palpable in either loin. The heart was small, but the left ventricle was hypertrophied and the muscle was firm. The liver presented numbers of pea-sized cysts scattered throughout its substance, oftenest immediately under the capsule, the cysts being filled by thin, clear fluid. Both kidneys were enormously enlarged, measuring 17 c.m. in length and 8 in breadth. The right weighed 740 grm. and the left 760 grm. The kidney substance was practically completely replaced by cysts varying in size from .5 to 3 c.m. On section some of the cysts released clear fluid, others a thicker brownish material. All of them were lined by a delicate, pale, glistening membrane. (See illustration.)

I am greatly indebted to Dr. H. M. Ray for assistance.

ORIGINAL ARTICLES.

CHRONIC INTERNAL HYDROCEPHALUS—THE NEWER METHODS FOR ITS RECOGNITION AND TREATMENT.*

By CHARLES A. ELSBERG, M.D., New York City.

The name "hydrocephalus" originated with the earliest medical writers who included under this term a large variety of pathological conditions, varying from hematoma of the scalp to distention of the ventricles of the brain. This view was still held in the middle ages. Ambroise Paré refers to cases described by Vesalius and Albucasis, and says that in hydrocephalus a collection of fluid or blood occurs "sometimes between the muscous skin and the pericranium, sometimes between the pericranium and the skull, and sometimes between the skull and the membrane called dura mater and otherwhiles in the ventricles of the brain." In another place he declares that the last variety is true hydrocephalus and is uniformly fatal. Modern medicine recognizes only distention of the ventricles as true hydrocephalus.

THE SOURCES, SECRETION AND ABSORPTION OF THE CEREBROSPINAL FLUID.

The cerebrospinal fluid and the subarachnoid space were discovered by Cottugno in 1784 and his researches, together with those of Robert Whytt (1768), first demonstrated that the fluid in the ventricles was more or less identical with and, in fact, formed part of the general cerebrospinal secretion.

It was inevitable that real advances in our knowledge of hydrocephalus could only come after the source of the cerebrospinal fluid, its secretion, and the channels by which it left the cranial cavity were better understood. The recent investigations of Mott, Dixon and Halliburton, Frazier and Peet, Weed and Cushing, and others have contributed much to our knowledge of the sources and the secretion of the fluid, while researches of Dandy and Blackfan and Frazier and Peet have given us a method for the determination of the rate of absorption from the subarachnoid space. These

*Read by invitation at the Meeting of the Pediatric Section of the New York Academy of Medicine, October 11, 1917. This paper is based upon 40 cases of hydrocephalus in infants and young children which we have studied at the New York Neurological Institute and at Mount Sinai Hospital. The large subject of the secondary ventricular distension which occurs in meningeal disease, and more especially in tumors of the brain and its coverings, will be considered in a second paper.

investigators have shown that the main—if not the only—sources of the cerebrospinal fluid are the choroid plexuses of the ventricles which Mott calls “choroid glands,” that the secretion is almost constant, and that its rate varies and is influenced by a number of factors. The rate of flow in animals is increased by asphyxia, by anesthesia, and by many drugs and organ extracts—especially by extracts of choroid plexus or brain tissue. The only glandular substance known to have a specific inhibitory effect on the secretory activity of the choroid plexus is thyroid extract (Frazier and Peet).

The cerebrospinal fluid is, as I have said, more or less continuously secreted; under normal conditions, it leaves the ventricles and is absorbed from the subarachnoid space of the brain and spinal cord directly into the blood stream. A number of investigators have shown that no fluid is absorbed by the walls of the ventricles, that perhaps a little may enter the blood stream by the veins of Galen, but that the greater part is absorbed by the villi of the arachnoid membrane over the convexities of the brain.

There is considerable experimental and clinical evidence to show that there is a circulation of cerebrospinal fluid and that it follows a regular course. From its source, in the lateral ventricles, the fluid passes into the third and through the iter into the fourth ventricle. It leaves the fourth ventricle by the foramina of Majendie and Luschka and the greater part of the fluid passes downwards in the spinal canal on the posterior aspect of the spinal cord. There is believed to be a steady flow of fluid downward behind the spinal cord and upward on its anterior surfaces; the fluid then spreads over the convexities of the hemispheres, from which regions it is, to a great extent, absorbed into the blood stream.

If this scheme of cerebrospinal fluid circulation is accepted as the correct one, then it is easy to understand why spina bifida is so apt to be complicated by hydrocephalus, and why the hydrocephalus is so apt to become aggravated after operative treatment of the spinal condition. In spina bifida, there is an obstruction to the downward passage of fluid in the spinal canal and hence a retention of fluid in the ventricles. In other words, the hydrocephalus which complicates spina bifida is often a true obstructive hydrocephalus, the obstruction being in the spinal canal instead of in the cranium. I have been able to prove this by studies of the absorption of phenolsulphonephthalein from the ventricles of such a patient, which showed a marked retention of the dyestuff in the ventricles with a normal absorption of the substance from the subarachnoid space over the cerebral convexities.

The very satisfactory results from puncture of the corpus

callosum in several of these little patients adds support to the explanation above given.¹

TYPES OF HYDROCEPHALUS AND THEIR DIFFERENTIATION.

The amount of fluid in the ventricles and in the subarachnoid space is kept within normal bounds by the proper balance between the amount secreted by the choroid plexus and the amount absorbed by the arachnoid villi. If the secretion is retained in the ventricles by an obstruction in the aqueduct of Sylvius or in the foramina of Majendie and Luschka, then the fluid collects in the ventricles, the latter become distended, and the typical *obstructive internal hydrocephalus* results. In animals, such a hydrocephalus has been produced by plugging the aqueduct of Sylvius with a pledget of cotton or other substance.²

If, on the other hand, there is either a hypersecretion of fluid so that more is secreted than can be taken care of by the arachnoid villi, or if the absorptive power of the arachnoid is diminished, or a combination of these two conditions obtains, the secretion collects and distends the ventricles. This is the variety known as *nonobstructive* hydrocephalus, which is divided into that due to *hypersecretion*, and that due to *diminished absorption*.

There is, as yet, no satisfactory explanation for the fact that in open (nonobstructive) hydrocephalus the fluid collects in the cavities of the brain, and very little if any of it is retained in the subarachnoid space over the cerebral convexities. The term "hydrocephalus" almost always means "Internal Hydrocephalus," no matter whether the retention of fluid is due to obstruction, diminished absorption, or hypersecretion. A slight increase of fluid in the subarachnoid space over the hemispheres is sometimes met with but considerable fluid, worthy of the name "external" hydrocephalus is exceedingly rare. There may, however, be an increased amount of fluid in the basal cisternae.

Some writers speak of an "external" hydrocephalus when they refer to a collection of fluid outside of the brain and inside of the dura, due to a leptomeningitis or pachymeningitis. A condition in which the fluid collects on the surface of the brain (when the brain is so much shrunken that a space remains between it and the dura, which can be filled by fluid) has little in common with true hydrocephalus. It has aptly been called "*hydrops ex vacuo*," and cases have been described among others by Richter, Legendie, Bokay, and Durante. There was not a single patient with any appreciable amount of fluid over the surface of the brain among my 40 cases. In every instance the cortex was found to be pressed

¹In a patient of Dandy and Blackfan, however, the absorptive power of the arachnoid membrane was much diminished.

²Dandy and Blackfan found a moderate degree of hydrocephalus in animals in which they had performed a low ligation of the vein of Galen.

against the inner surface of the dura by the fluid in the ventricles. This pressure was only relieved after the ventricles had been emptied by ventricular or spinal puncture.

The recent investigations have therefore taught us that there are three different types of hydrocephalus—that due to obstruction, that due to diminished absorption, and that due to hypersecretion, or a combination of several of these. Frazier adds a fourth type which he calls “occult hydrocephalus.” The accumulation of fluid in this variety is, as Frazier himself states, due to a lack of balance between the secretion and the absorption of cerebrospinal fluid and therefore “occult hydrocephalus” is simply a clinical variety of one of the types above mentioned.

For the differentiation of these types of hydrocephalus from each other, Dandy and Blackfan and Frazier and Peet devised and elaborated the method in which phenolsulphonephthalein is used as an indicator. A normal standard of absorption from the ventricles and subarachnoid space, and the time of normal communication between the ventricles and the subarachnoid space was thus determined. After introduction into the ventricles, phenolsulphonephthalein appeared in the urine in from ten to twelve minutes, and during two hours from 12 to 20 percent were excreted. When introduced into the subarachnoid space, the dye appeared in the urine in from six to eight minutes, and from 35 to 60 percent were excreted in two hours. The dye passed rapidly from the ventricles into the subarachnoid space, and appeared in the spinal fluid in from one to three minutes.

As an indicator carefully neutralized sterile phenolsulphonephthalein solution was used and the quantity excreted in the urine was determined by colorimeter reading.

The manner in which we are accustomed to use this method for the determination of the variety of hydrocephalus is the following: After examinations have shown that the kidneys functionate normally, a lumbar puncture is done, a cubic centimeter of fluid withdrawn, and through the same needle, one cubic centimeter of sterile neutral phenolsulphonephthalein (6 milligrams) is injected.³

All of the urine secreted within the succeeding two hours is collected and examined. If less than 30 percent of phenolsulphonephthalein has been excreted, there is a diminished absorption from the subarachnoid space. In several of our patients not a trace of the dye appeared in the urine in four to six hours, but in the cases where absorption was below normal, we most often obtained values between 2 and 14 percent.

Four or five days after the above test had been made and the

³The phenolsulphonephthalein that is used for testing renal efficiency is alkaline and irritating to the central nervous system. Carefully neutralized solutions should be used. These can be obtained sterile in one cubic centimeter ampoules.

normal or diminished absorption from the subarachnoid space had been determined, the ventricular injection was made.

In infants the ventricle is punctured through the lateral angle of the anterior fontanelle, one cubic centimeter of fluid withdrawn and one cubic centimeter of phenolsulphonephthalein injected. In older children, a small trephine opening is made under local or general anesthesia. After one minute a lumbar puncture is performed, a few drops of fluid allowed to escape every minute and tested. Normally, the phenolsulphonephthalein should appear in the fluid obtained by lumbar puncture within one to three minutes and the fluid should be strongly colored within three to five minutes. The urine should be collected for two hours and tested in the usual manner. If phenolsulphonephthalein fails to appear in the lumbar puncture fluid within ten minutes, the case is one of obstructive hydrocephalus, and if the patient is under anesthesia, the proper operative interference (puncture of the corpus callosum) can be done at once through the trephine opening.⁴

If the examinations above described have shown that the normal communication between the ventricles and the subarachnoid space exists, and that there is either a normal or subnormal absorption of fluid from the arachnoid, the next procedure is to determine whether the cerebrospinal fluid secretion is greater than normal. At first I was accustomed to make the diagnosis of hydrocephalus due to over activity of the choroid plexus by exclusion of the other two varieties. We found very soon, however, that in many patients there was both a diminished absorption and an increased production of fluid. The following test we have found fairly satisfactory:

A lumbar puncture is done every day or every other day. Where the secretion of fluid is normal, the quantity of fluid obtained at each puncture and the pressure of the fluid becomes steadily less after the first two or three punctures, so that thereafter only small quantities, escaping drop by drop, can be obtained. In hypersecretion, however, the amount of fluid obtained and the pressure under which it escapes remains constant for long periods. Thus we have had under observation a boy of six years in whom fifteen to thirty cubic centimeters of cerebrospinal fluid were obtained every other day for several months.

Unilateral obstructive hydrocephalus, i. e., distention of one lateral ventricle from obstruction of the foramen of Monro, undoubtedly occurs. It would be possible to determine this condition by separate injections of phenolsulphonephthalein into each lateral ventricle. In one patient with obstructive hydrocephalus, we were led to suspect a unilateral ventricular distension because the patient

⁴The trephine opening should always be made near the median line and just behind the coronal suture, so that a callosal puncture can be done through the same opening.

was unrelieved by puncture of the corpus callosum on the right side, but very quickly improved after the corpus callosum had been perforated from the left side. Of course, it is possible that the first callosal puncture was not satisfactorily done or that the opening did not remain patent.

The forty patients with chronic hydrocephalus which we have studied by these methods were divided as follows:

Obstructive hydrocephalus.....	10 cases.
Nonobstructive hydrocephalus.....	30 cases.
Nonobstructive, diminished absorption.....	18 cases.
Nonobstructive, hypersecretion.....	6 cases.
Nonobstructive, diminished absorption and hypersecretion.....	6 cases.

PRINCIPLES OF TREATMENT OF THE DIFFERENT TYPES OF HYDRO- CEPHALUS.

To mention all of the methods of treatment that have been suggested would occupy too much time, and would require a general survey of medical history. The following short summary is sufficient:

Many attempts have been made to drain the fluid from the ventricles. Some attempted to connect the ventricles with one of the pleural cavities by means of a silver tube or a piece of vein, or to trephine the body of one of the dorsal vertebrae from in front and to drain the fluid from the spinal subarachnoid space into the retroperitoneal cellular tissue. Some surgeons tried to make a communication between one of the ventricles and one of the venous sinuses or a jugular vein by means of a piece of vein taken from the thigh, but up to the present time, these procedures have been unsatisfactory. Others endeavored to form a connection between a ventricle and the subdural space by means of silver or gold canulae, by strands of silk or catgut, etc. Still others tried to drain the fluid into the subcutaneous tissues of the scalp, but they soon learned that the fluid would not be absorbed from that location. The methods regularly failed and now have only historical interest.

The same may be said of the proposal to drain the ventricle to the outside of the body for a time. Such a plan is as old as the hills; it was tried by Hippocrates and Celsus, and many centuries later resurrected by von Bergmann, followed by Keen, Kocher, Lane, Goodlee, Broca, Pott, and more recently by Haynes, by Sharpe, and others. In an exhaustive study made by Henschen in 1911, he concludes that drainage of the fluid to the outside is fatal in almost 90 percent of the patients and is an unjustified method of treatment which either results in death of the patient from more or less rapid meningeal infection, or does not improve the hydrocephalus.

Based upon the modern conception of the different types of hydrocephalus, the ideal treatment of the obstructive form would be to reopen the closed iter, or the obstructed foramina. Up to the present time, this can not be accomplished. For the hydrocephalus due to hypo-absorption, the correct treatment will have been discovered as soon as it is possible to increase the absorbing power of the arachnoid. But this may never be possible of accomplishment. We may be more sanguine, however, that it will soon be possible to control hydrocephalus due to hypersecretion by means of drugs which will diminish hyperactivity of the choroid plexuses. That thyroid extract is such a drug has already been proven by Frazier and Peet, and by others.

Many of the patients are brought to the surgeon with very advanced hydrocephalus. The blind spastic infants with enormous heads, in whom there is complete optic atrophy and in whom there remains only a thin layer of brain cortex are, of course, beyond all help. These unfortunates are well known in all our pediatric clinics, and on account of their hopelessness, are dreaded by the clinicians. The earlier the patients are sent to the surgeon, the better the chance of relief by surgical procedures after the type of the hydrocephalus has been determined.

1. *Hydrocephalus Due to Obstruction in the Aqueduct of Sylvius or the Foramina of Majendic and Luschka.*—In these patients a new channel between the ventricles and the subarachnoid space should be made by puncture of the corpus callosum. By a very simple and technically easy operation, a small opening is made near the median line, the dura incised, and a cannula passed by the side of the falx cerebri through the corpus callosum into a lateral ventricle. The opening is enlarged by manipulation of the cannula which is then withdrawn and the dura and scalp closed by suture. It is fairly certain that the opening will remain patent, and a new channel is formed for the escape of fluid from the ventricles into the subarachnoid space.

In properly selected cases, in which actual obstruction has been demonstrated, the results of this little operation are very satisfactory, and a complete cure may be effected. Up to the present time, obstructive hydrocephalus is the most favorable variety for treatment, and I have had a number of patients entirely relieved from all symptoms, who have remained well.

Puncture of the corpus callosum may be tried in patients with obstructive hydrocephalus in whom subarachnoid absorption has been demonstrated to be below normal. I have some evidence that in such cases the subarachnoid absorptive power may increase after the operation.

2. *Hydrocephalus Due to Hypersecretion.*—In these patients, a lumbar puncture should be done every few days and the patient

should be given thyroid extract in increasing doses up to the physiological limit. From 15 to 30 cubic centimeters of cerebrospinal fluid should be withdrawn at each puncture. The improvement in the general symptoms (headache, vomiting, size of head, changes in eye grounds, ataxia, etc.), will only begin after several months of treatment and when the lumbar puncture demonstrates a diminished secretory activity of the choroid plexus. During the past year I have seen very marked improvement in several little patients, an improvement such as we had never observed in patients treated by lumbar puncture alone, and I consider the thyroid treatment of great value. In hydrocephalus due to hypersecretion, a certain number of satisfactory results can be obtained by the combination of thyroid feeding and repeated lumbar punctures.

3. *Hydrocephalus Due to Diminished Absorption.*—These are the most unfavorable cases for treatment, and we have not, up to the present time, any satisfactory means for their relief. Repeated lumbar punctures and thyroid feeding may be tried, but I have seen very little improvement in my patients. We have not tried to drain the fluid into any cavities of the body as I am not convinced that real success can be expected from any of the methods that have been devised. We must hope that the future will bring forth new and improved procedures.

In those who have had a chronic hydrocephalus the size of the head will always remain larger than normal, although its circumference may diminish considerably if the treatment is successful. I have seen the circumference of the head decrease four to eight centimeters in one to three months after callosal puncture. If there is papilledema, this will rapidly subside under successful treatment and the improvement in the eye grounds and in vision will begin within a few days.

If the ataxia has been of long standing, it will require years for its complete disappearance, although a marked improvement will occur within the first few weeks of the operation.

THE CARE AND TREATMENT OF EPILEPTICS.

By WILLIAM T. SHANAHAN, M.D.,

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Epilepsy as a disorder affecting the human race has long been recognized. The care and treatment of those thus affected has naturally varied with the grasp of the condition had by the particular community in which the individual epileptic resided. As to the frequency of epilepsy, it would appear that, conservatively speaking, every two to three per thousand of the average population are epileptic.

Hippocrates recorded the opinion held in his time that the seat of epilepsy was in the brain. In our age this same opinion is still held. A hereditary defect, either similar or dissimilar, may be transmitted so that such an influence may play a very large part in the development of epilepsy in the descendant. The predisposition thus created causes the potential epileptic to be born into the world with an endowment below the normal, a handicap which prevents him from being able to resist deleterious influences which may act upon him subsequent to birth. If an individual with such an original endowment defect is fortunately placed as to his environment during infancy, childhood, and adolescence enough resistance may be developed so that the possibility of the bringing out of an epilepsy during the adult period is quite remote.

There seems much evidence to establish the fact that many an epileptic is such as the result of a lack of normal progressive development during the antenatal period of existence. Gross organic defect, e. g., a porencephaly, results from destruction of brain tissue during fetal life, the causative factor being what it may, in some a hereditary syphilis. The interference with the cerebral circulation during prolonged deliveries, and encephalitis and meningitis occurring during infectious disease in infancy and childhood seemingly in many instances act as etiological factors in the production of a subsequent epilepsy. Recent correspondence had with a considerable number of obstetricians and pediatricians throughout the United States shows that the general opinion held is that excluding factors just mentioned, i. e., actual injury to the brain during birth, either from prolonged delivery with associated long continued interference with circulation within the skull, or actual cerebral hemorrhage, or from use of forceps producing hemorrhage, and an actual encephalitis or meningitis accompanying infectious disorders occurring during early life that convulsions

during infancy and early childhood seldom or at least not necessarily develop into a later appearing epilepsy. If prolonged delivery plays the part that many physicians at present believe more first born should be epileptic than our available authentic information records. Spasmophilia is probably responsible for most convulsions observed during early life, this tendency disappearing with the development of the particular individual.

Intestinal stasis as the result of kinks, bands, ptoses, etc., of the various parts of the intestinal tract may in some instances so disturb the metabolic processes in the predisposed individual that epilepsy may result, but I cannot believe, as some claim, that in the majority of epileptics such is the sole cause of symptoms. Most of the surgery applied to rearrangement of the intestines is made use of without a proper broad perspective of the epileptic as a whole. Apparently alcohol, improper and excessive diet, and similar factors play a large part oftentimes in bringing out the symptoms of epilepsy. It must be impressed upon the reader, however, that many of the alleged causative factors producing epilepsy in the particular individual are but too often coincidental. No conclusive evidence has as yet been adduced to establish a specific germ infection as the cause of epilepsy.

Syphilis, either hereditary or acquired, seemingly produces epilepsy in a comparatively small percentage, 2 to 3 percent of those having the disorder. Kaplan's¹ *Wassermann paradoxus* was obtained in epileptics, spasmophilics and others displaying motor unrest, all of these showing no signs of syphilis in their physical examination or history.

The albuminuria, so commonly seen following seizures in epileptics, may indicate that kidney function is sufficiently disturbed at this time to permit of retention in the body of toxic substances which ordinarily are eliminated and which, in themselves, when so retained may actually produce convulsive seizures. The relationship of conditions in uremia, eclampsia, certain states of acidosis, etc., associated with convulsions to that which exists in certain forms of epilepsy is seemingly quite close. There is apparently in many cases of epilepsy a cumulative action of some toxic substance which results in the recurring seizure phenomena. The blood pressure in the average epileptic is somewhat higher than the normal.

To sum up many of the etiological factors, epilepsy may be considered as organic in a broad interpretation of the term, e. g., fetal encephalitis and meningitis due to hereditary syphilis or some other destructive agent acting during intrauterine life; obstetrical or subsequent trauma to the brain and its membranes; scarlet fever, measles, typhoid fever, etc., complicated by inflammatory

¹Wassermann Paradoxus, D. M. Kaplan (N. Y. Med. Journal, CV, p. 444).

processes affecting the central nervous system; cerebral endarteritis, etc., due to acquired syphilis, lead, etc., cerebral neoplasms; cerebral hemorrhage during paroxysms of pertussis; sunstroke; arteriosclerotic changes in cerebral vessels; changes due to chronic alcoholism; endocrine maladjustment at puberty, and at the involutional period, etc. These epilepsies, strictly speaking, are symptomatic. The idiopathic or essential epilepsy, with its peculiar constitutional makeup and psychogenic factors, are referred to elsewhere in this article.

The varieties of seizures which may occur in the epileptic are great, shading from a complete or major convulsive seizure commonly called *Grand Mal*, through the various gradations of incomplete convulsive attacks to the various minor seizures, *Petit Mal*, and the transitory psychic disturbances. The typical convulsive attack, while very common, is perhaps less frequently observed than atypical forms in many individual epileptics. The abortive or rudimentary attack, consisting oftentimes of prodromata with perhaps some clouding or impairment of consciousness, may appear as a forerunner of a series of seizures or of true status epilepticus itself. The essential factor of an epileptic seizure is not the convulsion but the temporary impairment or loss of consciousness. It should be remembered that an individual having convulsions is not necessarily epileptic.

The old discrimination between nocturnal and diurnal seizures should be discarded in favor of the classification; 1, seizures occurring during the sleeping state; 2, seizures occurring during the waking state.

Automatism, a condition frequently observed following minor seizures and those of an incomplete major type, and but seldom observed after a complete major convulsive attack, is too frequently unrecognized in the outside world, in consequence of which many an unfortunate epileptic has been arrested and punished because he had an epileptic seizure. The epileptic himself has, as a rule, a total amnesia for the automatic period, as well as for the seizure proper and therefore is not cognizant of what transpired during such period. From a medicolegal view point this particular phase of epilepsy, as well as the psychic disturbances of other kinds, is one which should especially be given more consideration than is ordinarily the case.

The mental status of an epileptic may be that of a congenital mental defect, appearing as an idiocy, imbecility or as but a mild degree of feeble-mindedness, moronity. On the other hand the individual epileptic may have originally been normal or even above the normal mentally and subsequently deteriorated to such an extent as to become completely demented. Transitory mental disturbances occurring at times other than after ordinary seizures are

commonly observed in some epileptics while still other epileptics apparently have no disturbance of consciousness, except when the ordinary *Grand Mal* or *Petit Mal* seizures occur.

Admitting that there is a general constitutional makeup peculiar to epileptics, it is to be expected that the majority may show some mental trends which differ from those observed in the ordinary non-epileptics, e. g., egotism, ego-centricity, loss or impairment of judgment, loss or impairment of adaptability to environment, loss of personal pride, restricted interests, lack of insight, etc. Many epileptics show a greater slowness of mental operation than is observed in the non-epileptic individual of the same general degree of mentality. It has been stated that lack of mental tension in the epileptic results in deterioration with a loss of interests in matters formerly actively attended to. While there is a normal variation of interests in non-epileptics, due consideration being given to rural and urban dwellers, educated and uneducated individuals, difference in sex, etc., many epileptics present a great narrowing of interests, and in those epileptics of higher mentality, when hope is given up of recovery and loss of interests follow, mental deterioration may be quite rapid.

Psychotherapy, in a broad sense, must be utilized to the fullest extent, in the treatment of epilepsy in securing the patient's co-operation, so essential in carrying out measures to obtain favorable results. The cultivating of self-control, personal discipline, reasonably strict rules of conduct, and the understanding on the part of the epileptic of his exact condition and what he must do in order to accomplish results are of prime importance, nay, absolutely demanded. The general application of common sense, hygienic and dietetic measures, persistently carried out over an indefinite period, with the correction of all abnormal physical and mental states, so far as such is possible, must be given thorough attention.

While it is often found impossible to entirely re-adjust neuropaths, nevertheless, a great deal can be done toward placing these individuals in a more suitable environment so that there will be less injurious stresses acting upon them.

Suitable occupation for the epileptic not only brings about sufficient muscular activity, so as to give the human machine the exercise necessary for proper co-ordinate function but, no doubt, transforms energy in such a way as to diminish epileptic seizures and hold in abeyance or entirely prevent, at least for long periods, mental deterioration.

Younger epileptics, who have been retarded because of a poor environment, may progress to a surprising degree if proper efforts along educational and occupational lines are carefully applied. In the epileptic the hours of labor should be regulated, so

as to produce a healthy fatigue, thus arousing a normal appetite for food and a demand for normal hours of sleep, with probably concomitant improvement in function of the entire gastrointestinal tract and related structures. Recreation should also be utilized in proper degree with a similar end in view.

The social aspects of epilepsy have in recent years been recognized to a greater extent by the general public than was formerly the case. The difficulty experienced in ordinary homes in giving care to an epileptic relative is such that urgent relief is oftentimes demanded. Not only may the epileptic in the family cause much worry to the other members, but such special attention is required by him that another member of the family of potential wage-earning capacity must remain in the home. Except in families with means, an epileptic having frequent seizures or showing active mental change cannot be indefinitely kept at home, but must be placed in an institution when such is available. It is, on the other hand, a well established and encouraging fact that many epileptics who show no marked mental impairment and whose seizures are comparatively infrequent may, with proper supervision, live in the outside world. Because of his disorder, many an epileptic, although his symptoms are not extreme, is precluded from earning his living, being forced in many instances to become a recluse, as employers do not care to have him continue in service owing to the occurrence of seizures which onlookers claim are unpleasant to witness. For this class, a more numerous one than ordinarily thought for, there is an almost unlimited opportunity of service by those interested in their afflicted fellowman. Out-patient clinics maintained by special institutions for consultation can accomplish much for them. In the specially arranged institution the epileptic is allowed all the liberty which broad consideration of his condition would warrant. He is afforded a more comfortable existence than can ordinarily be obtained outside of an institution. He is removed from an environment where many irritating and annoying stresses are active and placed where, so far as facilities permit of, all the upsetting factors are obviated.

It is a matter of history that as early as 1773 there was established in Germany a special home for those afflicted with the "falling sickness." During the next hundred years, with one or two exceptions, there was no expansion of this movement until the establishment of the well-known colony at Bethel, near Bielefeld, in Western Germany. Ohio in 1891 established a State hospital for epileptics, the first institution in the United States to make provision for separate care of epileptics. New York in 1894 established the Craig Colony for Epileptics, and shortly thereafter Massachusetts, New Jersey, Indiana and other States started similar institutions, until now fourteen States have provided separate hospitals

or colonies for this class of defectives. There are now in Europe many special institutions for epileptics.

The first principle of therapeutic aid to the epileptic is to establish, so far as feasible, a rule of life which will be a natural and simple one. This is the foundation on which all other treatment of epilepsy must be based. It should never be forgotten that the epileptic must be persistently treated. As there is in the epileptic a makeup which, according to our present belief, is inborn, the method of living indicated must be adhered to during the entire life of the particular epileptic. While it is oftentimes necessary to lay down strict rules covering every phase of life, later there may be a letting up to a degree of some rules, although there must be continued a proper regulation of all the activities of the individual. This lessening of the strictness of living must not be begun too soon, but there must be a gradual latitude allowed to develop to a certain minimum above which the epileptic must continue. The dropping below this level, permitting the disregard of fundamental principles of living and thus allowing the influences of aforesaid stresses to act results in the recurrence of the symptoms of the disorder. No epileptic should, under any circumstances, use alcohol as it seems, in the vast majority of this class, to be an agent which will provoke seizures.

The true epileptic, as has been mentioned before has an abnormal make-up, and while he may be fortunate enough to have his convulsions and other seizure phenomena in abeyance, his mannerisms, his reactions to various influences in ordinary environment, etc., can be but changed in part and not entirely removed. His is a receptive state which differs from the non-epileptic, so that disturbing influences acting upon him may bring to light or cause a recurrence of attacks which had been thought to have been permanently removed.

While the surgical treatment of epilepsy has its place, much injury has been done by irrational procedures. Trephining without proper indication for the same, indiscriminate short-circuiting and other attempts to alter the architecture of the gastro-intestinal tract cannot, except in a certain few carefully selected cases, give even for a comparatively short period the relief which some surgeons promise to considerable numbers of epileptics. In the epileptic, an individual with unstable nervous system and also seemingly with an abnormal functioning capacity of other vital parts, it seems contrary to reason to expect a surgical operation to bring about a complete restoration to a non-epileptic state, especially in those cases where the disordered function cannot be entirely relieved. The close individual medical and surgical attention given operative cases has, without doubt, a major part to do with the benefit experienced.

Potential epileptics require individual care and treatment and, while they must lead a restricted life, such should not be made too much of a hardship for them. Firm discipline is required but such can be made kindly and sympathetic and so obtain in a far more satisfactory manner the co-operation of the afflicted individual. Good, old-fashioned common sense in large doses is very necessary in the treatment of defectiveness and especially epilepsy. It must be realized that, to bring about the adaptation to a new environment and a readjusted manner of living, considerateness and patience are of greatest importance. The confidence of the individual epileptic whether child or adult, must be gained to bring about satisfactory results from the treatment. The general principle of modern treatment of the epileptic is to endeavor to place the individual epileptic at his or her proper life level, where there is permitted a sufficient exercise of mental activities and of occupation or recreation, to allow a proper degree of physical exercise, and the arrangement of a dietary which while removing offending foods and avoiding excesses, still allows substances sufficient to maintain nutrition. The use of bulky vegetable diet often mechanically relieves constipation thus making unnecessary the use of cathartic drugs.

Regarding the marriage of epileptics, such must be decided upon the individual case record. Sentiment defeats sense oftentimes when the question of marriage of an epileptic arises.

Too much stress cannot be laid upon the fact that lack of the proper degree of gentle direction of the handicapped defective, whether insane, feeble-minded, or epileptic with inability of the physician to exercise tact, caution, and a reasonable degree of common sense results so often in failure to succeed satisfactorily with the care of these classes. The utmost diplomacy is required oftentimes to not only secure the co-operation in treatment of the epileptic himself but also that of his family.

Experience in various parts of the world in the treatment of epilepsy in its multiplicity of phases has demonstrated clearly that for selected patients without too great mental defectiveness or deterioration, suitable change of environment, the directing of the energies along new channels, preventing too much self-centering of interests, and readjustment of any disturbing factors which might tend to cause undue psychic upset, proper refraction, dental therapy, and correction where possible of abnormal function of parts, placing the individual at a congenial occupation with sufficient recreation during hours of leisure, allowing a reasonably restricted diet, and a sensible hygiene, the life processes become so harmonized that there occurs marked improvement in many epileptics in whom no sedation of any kind has been resorted to. Sedatives such as bromides too often but mask symptoms

in epilepsy, tending to arouse false hopes as to complete recovery, and commonly to omit the basic readjustment of living conditions necessary to the well-being of an epileptic.

Individualization is mandatory for success in treatment. Relief, so far as possible from disturbance from environment must be secured to make socialization possible for epileptics with little or no lowering of the intellectual level. Music, artistic pursuits, re-education, must be made use of for epileptics of mentality sufficient to grasp same. Mental and physical recreation and rest in proper proportion for the abnormal physical and mental endowment which exists are required.

We must coincide with Clark's opinion that "No essential epileptic will ever recover from his *Grand Mal* attacks until he has found that life level to which he can fully adapt or adjust himself." Even though this level be attained and seizures cease, it will still remain an unsolved problem to meet a more demanding environment of ordinary everyday life without the return of seizures. "The arrested cases cannot stand the stress of a normal individual." Gradual cessation of all therapy is of vital importance and following up of arrested cases necessary.

THE TREATMENT OF MORPHINISM BY THE REDUCTION PROCESS.

By C. B. PEARSON, M.D., Arlington, Md.

I. How to manage the Reduction.

When the editor of the INTERSTATE MEDICAL JOURNAL asked me to contribute an article, I at first thought that I would write on the treatment of morphinism. On second thought I at once gave up the idea. An article that would do justice to this subject would be at least three times as long as anyone would care to read.

My treatment of morphinism like ancient Gaul is divided in three parts. Psychotherapy, reduction, and physico-therapy. The relative importance of each is indicated by the order in which they are named. The reader should not at once jump to the conclusion that, because I think that psychotherapy comes first, I am of the opinion that the addict's need of morphine is all in his head, and that we can treat his opinions and feelings in regard to this matter with contempt.

I cannot, however, encumber this article with matter that is foreign to its title, by attempting to discuss psychotherapy. On the other hand I do not wish the reader to suppose that I attach little importance to medication, rest, exercise, diet, etc., because I have placed physico-therapy last. The reader may think that reduction is simply a tapering off. Why write about it at all? This mental attitude is one of the reasons why so many physicians fail to secure results with this method.

Dr. Bishop of New York, in a personal letter to me some time ago, stated that there were only a few physicians who were successful with the reduction process and a very few who were successful with other methods. I believe that this is true. This is not because there are any insurmountable difficulties in the way, but because very few have really seriously attempted to solve the problems connected with the treatment of morphinism.

Those who look on morphinism as a habit, that can be continued or discontinued at will, and those who think that force and not therapeutics are needed in its solution, will not succeed in doing anything much but harm. And those who offer the profession easily applied routine methods of treatment can only confuse medical thought and delay a correct understanding of the matter. A certain amount of morphine can be taken away from an addict each day without serious discomfort, until the last fraction of a grain is removed.

Now reader, you who look on reduction as a mere tapering off process, have you any accurate idea of how much this amount should be in any given case? Be honest with yourself. If you do not know what this amount should be, then you must admit that reduction is something more than a mere tapering off process. Many no doubt will challenge my assertion that the drug can be removed, by reduction, without serious discomfort. Some will say, "I have tried it and I know." Others have tried and did not succeed in getting the drug away, let alone getting it away without discomfort. I can well believe all this. The majority do not know the addict and do not know the reduction technic. Besides this, perhaps the environment was not suited to the attempt.

I use no restraints of any kind. Ninety percent of my patients go through without doping on the side. Ninety-five percent voluntarily stay with me till the end. In addition to not using restraints, I always promise my patients that if, at any time, they become tired of my treatment, I will furnish them morphine enough to last until they get home. I keep this promise. Anyone who knows the morphine addict knows that, if his suffering were very great and he is under no restraint, he would either dope on the side or take advantage of my offer to supply him with morphine and go home.

I am not only willing but pleased to demonstrate my work to any physician who wishes to call at my place. I can furnish abundant proof of the correctness of my assertion that the drug can be removed without discomfort. One needs a syringe that will enable one to measure the dose correctly. I like a syringe with a glass barrel in a metal casing, with the minims marked on the piston. The syringe should be in perfect working order, so that you can put the syringe in the solution bottle with the needle attached and draw up the correct dose without drawing up any air. Because when you expel the air bubble you lose a little of the morphine and this is an important matter these days, when morphine and all other drugs are so high. It would be very important if morphine were only worth a cent a drachm. If the patient sees you waste morphine in this way he will get to thinking later that he ought to have that morphine that was wasted under his skin. Furthermore it gives the patient greater confidence in you to see that you are painstaking and accurate in your work. The mental attitude of the patient is important in any disease and it is easily ten times more important in morphinism.

Accuracy in dosage is important not alone for its psychic effect but also for its physical effect. If you want to tear your patient's nerves all to pieces there is no more certain way than to keep him first above the right dose and then below it. Accuracy in dosage is one of many factors that help to keep the patient com-

fortable. I carry nine solutions of morphine—1-15, 1-20, 1-30, 1-40, 1-60, 1-80, 1-120, 1-160, and 1-320.

Accuracy of dosage demands that the morphine for these solutions be carefully weighed and that the distilled water be carefully measured. One mistake in the preparation of a solution would be sufficient to cause a failure and may be several failures if you have more than one patient on the same solution.

How do you determine the rate of reduction? I reduce the patient as rapidly as he will stand for it. How do you know how rapidly the patient will be willing to go? I do not know and then I do. How can you know a thing and not know it? It is this way I cannot tell how much any patient will stand in advance. So I do not know. But my experience in handling these patients is such and my knowledge of their ways is such that, by observation, I know what rate of reduction to use from day to day. At least I hit the nail on the head about 49 times out of 50 which for all practical purposes amounts to the same thing as really absolute knowledge.

I give four regular doses of morphine per day, a dose before each meal and one before bedtime. A patient cannot eat when he is craving morphine and neither can he sleep. If a patient is taking 40 grs. per day what dose do you start him on. I give him the least amount that will keep him perfectly comfortable. How do you estimate this amount? Different operators use different ways. Some give the patient morphine during the first 24 hours whenever he asks for it and in such doses as he seems to need, in the meantime keeping a record of each dose. The next day they divide the whole amount by four or whatever number of doses they give daily. This gives very nearly the correct amount. I have found by experience that 8 grs. per day combined with appropriate treatment will more than keep a patient comfortable. So I would start such a patient off like this: for the first 2 days 30 m. 4 times a day of a 1-15 solution, or 2 grs. at a dose. If the patient not only shows no sign of discomfort but is drowsy a good part of the day I know that he is getting more than he needs and I start down the line like this: 3d day, 29 m., 28 m., 27 m., 26 m.; 4th day, 25m., 24 m., 23 m., 22 m., and so on until he seems to take an active interest in dose time. Then I keep him on even doses for the day just one minim less than the day before. I keep him on the 1-15 solution as long as I can do so and feel sure that he will be comfortable. If the patient is on 11 m. 4 times per day how will we get him on the next smaller dose in the 1-20 solution? The equivalent dose is 14 2-3 m. So the next smaller dose is 14 m. 1-20 solution or just exactly 14-20 grain at a dose. A mistake in going from one solution to another might easily mean a failure to cure your patient. In fact, mistakes on the part of the

operator are responsible as a general rule for the bad behavior of these patients rather than the general cussedness that the inexperienced operator imagines always goes with morphinism.

Anyone can reduce a patient from almost any amount down to 1 gr. daily. Because the reduction down to this point is easy many operators suppose that it is good practice to get over this part of journey as rapidly as possible. This is a great mistake. The getting away of the last grain is where skill counts. The best way to get this last grain is to begin to prepare for it as soon as the patient comes under your care. I go very leisurely indeed from the least amount needed for comfort down to 1 gr. per day. If the patient has been taking 40 grs. per day the removal of the surplus amount cannot fail to be of great benefit to him. And the more time within reason that you give the patient to profit by the removal of this surplus the easier it will be to get that last grain.

Then again the more time you give the patient to reach 1 grain, the better you will be acquainted with him and the more effective your psychotherapeutic measures will be at the time when they are most needed. Lastly if you give the patient time in getting him to the last grain he will profit by the medication you use and by attention to his diet, rest exercise, etc. With the patient properly prepared the getting of that last grain should be an easy matter.

Now it should be remembered that it is not so much the quantity of the drug removed daily that counts, as the proportion of the daily amount needed for comfort. For instance, when we started the reduction with this patient who had been taking 40 grs. daily, our first cut was 1-30 of the whole amount, but when we took him from 12 m. to 11 m. on the 1-15 solution we took away 1-12. Although in both cases the amount was the same. And again when we took him from 11 m. of that solution to 14 m. of the 1-20 solution we lessened both the amount and the proportion.

Paradoxical as it may seem the quickest way to bet the patient off the drug by reduction is to go slowly. When I first commenced this work, in my anxiety to relieve my patients of their horrible affliction, I frequently went too fast and got my patients' nerves all in a tangle, and was obliged to go back a couple of weeks on the reduction and start down the line over again more carefully. This means more discomfort for the patient and also loss of time and money.

A good chess player is able to visualize the position of the pieces four or five moves in advance. So the skillful operator in this line should be able to foresee insomnia, nervous breakdown, or other trouble that may follow a too rapid rate of reduction four or five days in advance. That is to say one should be able to foresee all

these things in ample time to prevent them by changing to a slower rate.

I never go backwards with my patients nowadays. Anxious as I am to get them well I go slowly and carefully; I keep cool and always hold an optimistic view of the future and also endeavor by every means in my power to communicate this optimistic view of things to my patient, and keep him from getting excited or out of sorts. If we make a little progress each day and keep on going we are bound to get somewhere. After I pass the 1 gr. per day point I go more rapidly. That is the proportion of the drug that I remove is greater. With these nine solutions that I carry I can go rapidly or slowly just as I wish and at the same time go smoothly. For instance, in cases that have been taking the drug for 30 years or more we may expect that the drug will cling with great persistence. In such a case instead of going down to 11 m. on the first 1-15 solution we stop at 25 m. and go to 33 m. of the 1-20 solution, then down perhaps to 23 m., then to 34 m. of the 1-30 solution, and so on.

If we find that one of these 30-year addicts is standing the reduction better than we had hoped for, we can go down to a smaller number of minims on each next weaker solution, and thus gradually increase the rate of reduction. We can go rapidly or slowly, just as we please, and yet make the reduction perfectly smooth.

For instance, suppose that we have the addict on $\frac{1}{4}$ gr. per dose, four times per day. We can carry him down like this:

10 m., 10 m., 10 m., 10 m., 1-40 solution.
9 m., 9 m., 9 m., 9 m.
8 m., 8 m., 8 m., 8 m., or like this:
15 m., 15 m., 15 m., 15 m., 1-60 solution.
14 m., 14 m., 14 m., 14 m., or like this:
20 m., 20 m., 20 m., 20 m., 1-80 solution.
19 m., 19 m., 19 m., 19 m., or in an extremely difficult case:
30 m., 30 m., 30 m., 30 m., 1-120 solution.
29 m., 29 m., 29 m., 29 m.

In all cases we give even doses for the day just one minim less than the dose for the preceding day. At this point perhaps the reader will conclude that the slower the rate of reduction the better for the patient. Such is not the case. We should not go any more rapidly than the patient's body can adjust itself to the cut. On the other hand we should never go any more slowly than the necessities of the case demand. If we do both the patient's mind and body will become wearied with the effort to get free from the drug.

The reader can, of course, readily see how the patient might become discouraged by a long drawn out treatment. He cannot perhaps so readily see how the body itself would become wearied

with the effort. I have seen enough of these cases to be firmly convinced that if the reduction is too long drawn out that the body will at last begin to demand larger doses, and that the patient will most certainly be far more uncomfortable on a too lengthy treatment, than he would have been had a more rapid rate of reduction been chosen. We must always try to strike the happy medium between too fast and too slow, for the one is every whit as uncomfortable as the other for the patient. If we attend to our business and watch our patients closely this is not a difficult thing to do. With some patients it is better to give extra doses in between the regular doses. Although, if the patient will leave the time of the reduction and all other matters to us and will refrain from alcoholic indulgence, it is rarely really necessary.

I sometimes have to treat patients who have relapsed, after taking treatment at places where it was the custom to give extra doses freely, or where a large number of regular doses were given.

In cases of this sort I give the extra doses. Inasmuch as they are not really needed except that the patient's mental attitude makes them so in a measure, the reader might be excused for thinking that it would be bad practice to permit the patient to have his own way in this matter. This is not the case. It is better to have the patient satisfied than to always have your way especially in minor matters. And this is really a minor matter. For when giving an extra I give 1-3 or $\frac{1}{2}$ of the regular dose, so the reader can see that the extra becomes smaller each day at exactly the same rate as the regular dose. This being the case, the patient goes down the line steadily just the same as though no extra doses were given. However, I always try to overcome this mental attitude, if I can, for it is better and a little more comfortable (although the difference is not great) for the patient to confine himself to the regular doses. This gives him more time for recreation. My observation teaches me that his stay with me will be more pleasant on the four doses per day. On very rare occasions an extra dose is really needed. When such is the case I always give the patient an extra dose whether he asks for it or not.

One great advantage of this treatment is that the convalescence begins long before the last dose is taken away. In fact the convalescence begins in a week or ten days. As I have already said the addict profits by the removal of the surplus morphine.

Our colored cook expressed the matter correctly when she said: "When dey first comes in dey nibbles and den dey eats more and more till dey eats like hawks. If I was de doctah I wouldn't give dem any of dem medicines to make dem eat so dese wah times."

During the last two weeks of the reduction the patients not only feel better, but they look and act better. They are more alert both mentally and physically. A lawyer whom I treated expressed the

matter forcibly by saying during the last two weeks of the reduction that he was just beginning to see Baltimore. He had been going to matinées all through the treatment, but, at last, his perceptions had become so sharpened that he was really beginning to observe clearly and to note and remember what he saw.

The reader will have already taken note of the fact that I have emphasized the fact that I try to keep my patients comfortable. I do not do this to cater to the wishes of my patients. I have sound therapeutic reasons for so doing. In every branch of medicine and surgery it is generally conceded that he is a wise man who looks after the comfort of his patients. Why anyone should drop a precept that is considered sound practice in all branches of medicine, and pursue an opposite course of action when he comes to the morphine addict is something that I cannot understand. We all know that prolonged suffering and discomfort is very trying to a patient's vitality. We also know, or should know, that the morphine addict's vitality and nervous strength are at a low ebb to begin with. If the addict relapses because of general cussedness, punishing him during treatment might serve as a warning.

In 90 percent of all cases the addict relapses through a lack of nervous and mental tone. This being the case we should take great pains during treatment to build up, as far as lies in our power, the patient's nervous strength. And surely we should avoid anything that will do him harm. Uncalled for suffering belongs in this category. There are many who think that it does not matter how you get the morphine away so long as you succeed in doing so. I have learned from experience that this is not the case. Many years ago my father had a prolonged painful illness. He was given morphine for about 12 weeks and then it was at once stopped. I was a lad then in my teens. It fell to me to be obliged to work with him for the next two years. For the two years following the removal of this morphine he was the most irritable and disagreeable man imaginable. Of course, he was not a man who could rally quickly. Reader, it is well to remember that there are many such. I did know what was the matter with him then and, fortunately, neither did he. He might and perhaps would have become an addict had he known. On account of my experience with these cases, and because I recall distinctly my father's actions and symptoms during those two years, I have no hesitation in saying that they were due to the abrupt withdrawal of the morphine. Had he been handled as I would handle a like case today, two weeks' treatment would have saved him all the irritability and also have saved him a reputation of having an unlovely disposition.

I wish the reader to understand that there are many ways and

methods of treatment that will enable the *physician* to quickly remove the drug, but that there are no ways or methods that will quickly restore the *patient* to complete health. And it is my opinion that there never will be. Of course, I make an exception in such recent cases as that of my father.

How can we tell when a patient is really suffering for morphine? Usually there will be evidence of profound mental depression, increase of tear flow, shivers, increased secretion from the nose, cutis anserina, etc. However, these symptoms vary so much in different cases, that it is a difficult matter to describe them so vividly that an inexperienced person would at once be able to diagnose the condition. Any person, however, of ordinary perceptive powers who has lived in the same house with these people learns to know when they really need morphine and when they do not. The call for morphine is almost always physical. There are rare cases where there is a mental craving for opium narcosis, just as there is in the case of whiskey. How can we tell when a patient has nothing more than a mental craving for the drug? In the first place, there is a total lack of the objective symptoms, and the patient's attempts to fake these symptoms are so obvious that no experienced person would be likely to be deceived. Then there is a different behavior in the two cases when you attempt to afford relief. If the patient really needs morphine he will always be thankful for the relief experienced and show it in ways that cannot well be mistaken. On the other hand, if you give the patient with the mental craving a dose of morphine four times as large as would be necessary to relieve him and he will be back in a little while and say to you, "Doctor, that dose did not touch me at all." This latter case is one of the many instances where psychotherapy comes into play.

In the first case, one should carefully estimate the morphine that will be necessary to set the patient right and this should be given preferably at one dose. In any case the patient should be made comfortable. If this is done promptly there need be no delay in the reduction. However, if you crowd the patient too far, the best that you can do, if you wish to get the morphine away without shock or suffering, will be to set the patient back two weeks. This, of course, means delay. On the other hand, if you really get the second case quiet with morphine, you will have to give intoxicating doses and this will mean a still greater delay in the treatment, for it will practically mean starting clear back to the beginning. In either case the failure to do the right thing at the right time will very likely mean that your patient will become discouraged and quit treatment altogether. It may be of interest to the reader to describe how I solved a case of mental craving for the drug. This case in particular set up such a wail that he could be heard two

blocks away. I knew that he was not suffering for morphine any more than I was. He was always worrying about the dose he was getting. I had often cautioned him against doing this. I scolded the patient good and proper for several minutes. That is, I made him think that I was scolding him. I am never cross or irritable with my patients. I said to him among several things, "Now you have done the very thing that I have cautioned you against doing; you have worked yourself up to such a pitch that you have really and truly brought on an unnecessary craving for morphine, and the only thing on earth that I can do for you is to set you back two weeks." I soon had him singing and laughing and as comfortable as an old shoe. I did not set him back two weeks, neither did I give him a fraction of a grain more than was coming to him. To cope with these cases one needs to be a sympathetic, earnest, and artistic liar.

Of course, the reader will readily understand that one could not make use of the above mentioned trick very often. One needs to have a whole bundle of psychotherapeutic tricks to select from as the occasion arises.

I cannot conceive of one succeeding with the reduction process who is not able to give a workable answer to the question, "Does the patient need more morphine than he is getting or does he not?" The man who looks on the addict as being a liar under any and all circumstances will never succeed with reduction. On the other hand, the man who is so simple and confiding as to believe all that they say will never succeed with this method. Addicts frequently tell the truth and they also frequently lie. It is up to the operator to be able at all times to distinguish the true from the false.

I carry my patients down to 3-320 gr. four times per day. The last day perhaps I give them only one dose. The reader, no doubt, thinks that this must be tertiary insanity. I thought so once myself. I have learned through sad experience that it is sound therapeutics. I have stopped some cases successfully at 1-64 gr. Others went to pieces. Unfortunately when this happens 1-64 gr. will not set the patient right. It will more likely take $\frac{1}{8}$ gr. This will mean a delay of at least two weeks. In the natural course of events it only takes two more days to carry the patient to 3 gr. 320, so why experiment?—5 gr. 320, 4 gr. 320, 3 gr. 320. After the latter dose I have never had any trouble. Of course, in cases of only three or four months standing, it is not necessary to go to such minute doses. But even here it is best to err on the safe side.

In conclusion I will say that this method has yielded *me* the largest measure of success. *Others* may find other methods more suitable to their temperament and circumstances.

Reduction without the suitable application of both psycho and

physiotherapy would be pretty sure to yield very indifferent results.

Dr. —, of Pennsylvania; age, 45; duration of morphine addiction, 10 years; an alcoholic for 20 years; continued the immoderate use of alcohol after taking up morphinism; cause, alcoholism; daily amount of morphine 10 gr.

1915.

May 12,	30 m.,	29 m.,	28 m.,	27 m.,	1-15 solution.
May 13,	25 m.,	24 m.,	23 m.,	22 m.	
May 14,	21 m.,	20 m.,	19 m.,	19 m.	
May 15,	18 m.,	17 m.,	16 m.,	15 m.	
May 16,	14 m.,	14 m.,	13 m.,	13 m.	
May 17,	12 m.,	12 m.,	11 m.,	11 m.	
May 18,	10 m.,	10 m.,	9 m.,	8 m.	
May 19,	10 m.,	10 m.,	10 m.,	10 m.,	1-20 solution.
May 20,	9 m.,	9 m.,	9 m.,	9 m.	
May 21,	8 m.,	8 m.,	8 m.,	8 m.	
May 22,	7 m.,	7 m.,	7 m.,	7 m.	
May 23,	10 m.,	10 m.,	10 m.,	10 m.,	1-30 solution.
May 24,	9 m.,	9 m.,	9 m.,	9 m.	
May 25,	8 m.,	8 m.,	8 m.,	8 m.	
May 26,	7 m.,	7 m.,	7 m.,	7 m.	
May 27,	9 m.,	9 m.,	9 m.,	9 m.,	1-40 solution.
May 28,	8 m.,	8 m.,	8 m.,	8 m.	
May 29,	7 m.,	7 m.,	7 m.,	7 m.	
May 30,	6 m.,	6 m.,	6 m.,	6 m.	
May 31,	9 m.,	9 m.,	9 m.,	9 m.,	1-60 solution.
June 1,	8 m.,	8 m.,	8 m.,	8 m.	
June 2,	7 m.,	7 m.,	7 m.,	7 m.	
June 3,	6 m.,	6 m.,	6 m.,	6 m.	
June 4,	5 m.,	5 m.,	5 m.,	5 m.	
June 5,	7 m.,	7 m.,	7 m.,	7 m.,	1-80 solution.
June 6,	6 m.,	6 m.,	6 m.,	6 m.	
June 7,	8 m.,	8 m.,	8 m.,	8 m.,	1-120 solution.
June 8,	7 m.,	7 m.,	7 m.,	7 m.	
June 9,	6 m.,	6 m.,	6 m.,	6 m.	
June 10,	7 m.,	7 m.,	7 m.,	7 m.,	1-160 solution.
June 11,	6 m.,	6 m.,	6 m.,	6 m.	
June 12,	5 m.,	5 m.,	5 m.,	5 m.	
June 13,	4 m.,	4 m.,	4 m.,	4 m.	
June 14,	7 m.,	7 m.,	7 m.,	7 m.,	1-320 solution.
June 15,	6 m.,	6 m.,	6 m.,	6 m.	
June 16,	5 m.,	5 m.,	5 m.,	4 m.	
June 17,	4 m.,	3 m.,	3 m.,	2 m.	
June 18,	0	0	0	0	

This patient let go of the drug very easily. The reader might meet with bitter disappointment should he try to pattern after this reduction in an apparently similar case.

Mrs. —, of Michigan; age, 56, married; duration of addiction, 32 years; daily amount, 8 grs. of morphia. Prior to the Harrison Act the daily amount was 30 grs. Never had taken treatment before and like every other such case, not difficult to manage; had always taken the drug by mouth, and the following doses were given by mouth. Some operators think the hypodermic a necessity

in the treatment of morphinism. Such is not the case, for I have frequently managed these cases with entire success without it.

1917.

June 8, 24 m., 24 m., 24 m., 24 m., 1-15 solution.
 June 9, 23 m., 23 m., 23 m., 23 m.
 June 10, 22 m., 22 m., 22 m., 22 m.
 June 11, 21 m., 21 m., 21 m., 21 m.
 June 12, 20 m., 20 m., 20 m., 20 m.
 June 13, 19 m., 19 m., 19 m., 19 m.
 June 14, 26 m., 26 m., 26 m., 26 m., 1-20 solution.
 June 15, 25 m., 25 m., 25 m., 25 m.
 June 16, 24 m., 24 m., 24 m., 24 m.
 June 17, 23 m., 23 m., 23 m., 23 m.
 June 18, 22 m., 22 m., 22 m., 22 m.
 June 19, 21 m., 21 m., 21 m., 21 m.
 June 20, 21 m., 21 m., 21 m., 21 m.
 June 21, 20 m., 20 m., 20 m., 20 m.
 June 22, 20 m., 20 m., 20 m., 20 m.
 June 23, 19 m., 19 m., 19 m., 19 m.
 June 24, 18 m., 18 m., 18 m., 18 m.
 June 25, 17 m., 17 m., 17 m., 17 m.
 June 26, 24 m., 24 m., 24 m., 24 m., 1-30 solution.
 June 27, 23 m., 23 m., 23 m., 23 m.
 June 28, 22 m., 22 m., 22 m., 22 m.
 June 29, 21 m., 21 m., 21 m., 21 m.
 June 30, 26 m., 26 m., 26 m., 26 m., 1-40 solution.
 July 1, 26 m., 26 m., 26 m., 26 m.
 July 2, 25 m., 25 m., 25 m., 25 m.
 July 3, 24 m., 24 m., 24 m., 24 m.
 July 4, 23 m., 23 m., 23 m., 23 m.
 July 5, 22 m., 22 m., 22 m., 22 m.
 July 6, 21 m., 21 m., 21 m., 21 m.
 July 7, 20 m., 20 m., 20 m., 20 m.
 July 8, 19 m., 19 m., 19 m., 19 m.
 July 9, 18 m., 18 m., 18 m., 18 m.
 July 10, 17 m., 17 m., 17 m., 17 m.
 July 11, 16 m., 16 m., 16 m., 16 m.
 July 12, 15 m., 15 m., 15 m., 15 m.
 July 13, 14 m., 14 m., 14 m., 14 m.
 July 14, 13 m., 13 m., 13 m., 13 m.
 July 15, 12 m., 12 m., 12 m., 12 m.
 July 16, 11 m., 11 m., 11 m., 11 m.
 July 17, 15 m., 15 m., 15 m., 15 m., 1-60 solution.
 July 18, 14 m., 14 m., 14 m., 14 m.
 July 19, 13 m., 13 m., 13 m., 13 m.
 July 20, 12 m., 12 m., 12 m., 12 m.
 July 21, 15 m., 15 m., 15 m., 15 m., 1-80 solution.
 July 22, 14 m., 14 m., 14 m., 14 m.
 July 23, 13 m., 13 m., 13 m., 13 m.
 July 24, 12 m., 12 m., 12 m., 12 m., 1-80 solution.
 July 25, 11 m., 11 m., 11 m., 11 m.
 July 26, 10 m., 10 m., 10 m., 10 m.
 July 27, 9 m., 9 m., 9 m., 9 m.
 July 28, 11 m., 11 m., 11 m., 11 m., 1-120 solution.

1917.

July 29, 11 m., 11 m., 11 m., 11 m.
 July 30, 10 m., 10 m., 10 m., 10 m.
 July 31, 9 m., 9 m., 9 m., 9 m.
 Aug. 1, 8 m., 8 m., 8 m., 8 m.
 Aug. 2, 10 m., 10 m., 10 m., 10 m., 1-160 solution.
 Aug. 3, 9 m., 9 m., 9 m., 9 m.
 Aug. 4, 8 m., 8 m., 8 m., 8 m.
 Aug. 5, 7 m., 7 m., 7 m., 7 m.
 Aug. 6, 6 m., 6 m., 6 m., 6 m.
 Aug. 7, 5 m., 5 m., 5 m., 5 m.
 Aug. 8, 9 m., 9 m., 9 m., 9 m., 1-320 solution.
 Aug. 9, 8 m., 8 m., 8 m., 8 m.
 Aug. 10, 7 m., 7 m., 7 m., 7 m.
 Aug. 11, 6 m., 6 m., 6 m., 6 m.
 Aug. 12, 5 m., 5 m., 5 m., 5 m.
 Aug. 13, 4 m., 4 m., 3 m., 3 m.
 Aug. 14, 0 0 0 0

The reader will take note that at two or three points during the reduction that I departed from my general rule and did not reduce the drug every day. This was not due to any acute distress. It was because of nostalgia. The patient, a farmer's wife, had never before been but a few miles from her Michigan home. The reader may say, "pooh," why pay any attention to such a trifle." It is attention to trifles that enables me to keep my patients comfortable at all times. And why spend such a long time? Is not the patient's comfort and well being worth it? During treatment she was up and about all the time, went all over Baltimore and is at this writing, eating three good meals a day, and sleeping soundly at night. Had some physician treated her by some hammer and tongs method, she most likely would be back on the drug by now.

For over twenty-five years this patient led the life of a hermit. Today she is out among people renewing the acquaintance of friends of her young womanhood that she had not seen or spoken to for years. In other words, she is living the normal life. A few weeks' time is not too much considering the results.

Dr. —, of West Virginia; age, 42, length of addiction, 10 years; cause, alcoholism; daily amount when received for treatment September 16, 1917, 20 grs. morphia. Had taken several treatments among them the Towne-Lambert. Had never abstained long enough to reach anywhere near complete convalescence. Cases like this are more difficult to manage than those who have never been treated. The case was further complicated by the use of hyoscine and whiskey.

1917.

Sept. 16, 10 p. m., 30 m., 1-15 solution.
 Sept. 17, 29 m., 28 m., 27 m., 26 m.
 Sept. 18, 25 m., 25 m., 24 m., 24 m.
 Sept. 19, 23 m., 23 m., 22 m., 22 m.
 Sept. 20, 21 m., 21 m., 20 m., 20 m.
 Sept. 21, 19 m., 19 m., 18 m., 18 m.
 Sept. 22, 17 m., 17 m., 16 m., 16 m.
 Sept. 23, 15 m., 15 m., 15 m., 15 m.
 Sept. 24, 14 m., 14 m., 14 m., 14 m.
 Sept. 25, 13 m., 13 m., 13 m., 13 m.
 Sept. 26, 12 m., 12 m., 12 m., 12 m.

1917.

Sept. 27,	15 m.,	15 m.,	15 m.,	15 m.,	1-20 solution.
Sept. 28,	14 m.,	14 m.,	14 m.,	14 m.,	
Sept. 29,	13 m.,	13 m.,	13 m.,	13 m.,	
Sept. 30,	12 m.,	12 m.,	12 m.,	12 m.,	
Oct. 1,	11 m.,	11 m.,	11 m.,	11 m.,	
Oct. 2,	10 m.,	10 m.,	10 m.,	10 m.,	
Oct. 3,	9 m.,	9 m.,	9 m.,	9 m.,	
Oct. 4,	8 m.,	8 m.,	8 m.,	8 m.,	
Oct. 5,	7 m.,	7 m.,	7 m.,	7 m.,	
Oct. 6,	10 m.,	10 m.,	10 m.,	10 m.,	1-30 solution.
Oct. 7,	10 m.,	10 m.,	10 m.,	10 m.,	
Oct. 8,	10 m.,	10 m.,	10 m.,	10 m.,	
Oct. 9,	9 m.,	9 m.,	9 m.,	9 m.,	
Oct. 10,	8 m.,	8 m.,	8 m.,	8 m.,	
Oct. 11,	7 m.,	7 m.,	7 m.,	7 m.,	
Oct. 12,	9 m.,	9 m.,	9 m.,	9 m.,	1-40 solution.
Oct. 13,	8 m.,	8 m.,	8 m.,	8 m.,	
Oct. 14,	7 m.,	7 m.,	7 m.,	7 m.,	
Oct. 15,	10 m.,	10 m.,	9 m.,	9 m.,	1-60 solution.
Oct. 16,	8 m.,	8 m.,	8 m.,	8 m.,	
Oct. 17,	7 m.,	7 m.,	7 m.,	7 m.,	
Oct. 18,	9 m.,	9 m.,	9 m.,	9 m.,	1-80 solution.
Oct. 19,	8 m.,	8 m.,	8 m.,	8 m.,	
Oct. 20,	7 m.,	7 m.,	7 m.,	7 m.,	
Oct. 21,	6 m.,	6 m.,	6 m.,	6 m.,	
Oct. 22,	8 m.,	8 m.,	8 m.,	8 m.,	1-120 solution.
Oct. 23,	7 m.,	7 m.,	7 m.,	7 m.,	
Oct. 24,	6 m.,	6 m.,	6 m.,	6 m.,	
Oct. 25,	5 m.,	5 m.,	5 m.,	5 m.,	
Oct. 26,	6 m.,	6 m.,	6 m.,	6 m.,	1-160 solution.
Oct. 27,	5 m.,	5 m.,	5 m.,	5 m.,	
Oct. 28,	4 m.,	4 m.,	4 m.,	4 m.,	
Oct. 29,	7 m.,	7 m.,	7 m.,	7 m.,	1-320 solution.
Oct. 30,	6 m.,	6 m.,	6 m.,	6 m.,	
Oct. 31,	5 m.,	5 m.,	5 m.,	5 m.,	
Nov. 1,	4 m.,	4 m.,	3 m.,	2 m.,	1-320 solution.
Nov. 2,	0	0	0	0	

The reader will understand that in my article I give general directions for the management of the reduction. In actual practice these general directions have to be varied to meet individual cases.

On October 6 the patient became shockingly drunk. This accounts for the even doses from October 6 to October 8 inclusive. I never give larger doses because of indulgence in alcohol. The most that I ever do is to hold them on even doses until they recover from the effects of their indiscretion. Usually I go right on with the reduction. In some institutions they set them back two weeks on such occasions. To my mind this is only tempting them to get drunk on purpose to get more morphine.

Mr. —, of Virginia; age, 42; recently relapsed; was taking about $\frac{3}{4}$ gr. daily; duration of relapse, two weeks.

1917.

Oct. 22, 5 p.m., 20 m., 19 m., 1-120 solution.

Oct. 23, 18 m., 17 m., 16 m., 15 m.

Oct. 24, 14 m., 13 m., 12 m., 11 m.

Oct. 25, 10 m., 9 m., 8 m., 7 m.

Oct. 26, 6 m., 5 m., 6 m., 5 m., 1-160 solution.

Oct. 27, 4 m., 3 m., 2 m., 0

Last two doses on October 26 1-160 solution.

The reader may ask could not this patient have discontinued the drug unaided? I think that he could have done so. Then would not that have been the wisest thing for him to do? I say most assuredly not. For in that case he would have said, "I heat the game that time, I can do it again if I wish." And very shortly he would have found himself deep in the drug again. Furthermore the addict is not a malefactor. He is ill. When a man is ill the better thing to do is to place himself in the hands of a physician. But doctor did you really need to give this man morphine? *It was not absolutely necessary.* But, when a man is sick, why select an uncomfortable way to restore him to health when it is just as easy to select a comfortable one?

Furthermore, I had treated this man before when he was in a desperately bad condition. I took him off the drug on that occasion, without causing him any discomfort. This being the case, I think that the patient would have had just cause for complaint had I failed to do so on this second occasion. A little common sense is a valuable adjunct to medical knowledge.

THE SHOPLIFTER—WITH A NOTE ON CHROMESTHESIA.

By F. C. STUDLEY, M.D., Milwaukee, Wis.

The subject of this paper is a shoplifter—regardless of whether you classify her as “common thief,” kleptomaniac, moral imbecile, psychopath, genius, or insane.

Shoplifting is technically and legally larceny and larceny, under the law, is a punishable offense. Kleptomania is not a disease at all, it is a symptom of disease and is found in many forms of mental disturbance, notably in impulsive insanity, and is considered in the same class with pyromania, dipsomania, etc. Even normal persons, either in childhood or later on in years, are subject to a variety of impulsive and compulsive mental states, in which a tendency to steal is subjectively experienced and not infrequently indulged in. The impulse to touch a certain tree is an illustration of morbid impulse, so too the impulse to throw oneself from a height, to commit suicide or murder, but it is only with that state of morbid impulse indulgence in which constitutes crime, that we are at this time concerned. So too there are in most normal persons intellectual defects of varying degree, as, for example, a defect in the appreciation of music so that some cannot even carry a tune, the linguist frequently defective in all appreciation of mathematics, or vice versa, and such a degree of defect may actually amount to a specialized idiocy.

The subject of this paper was arrested for shoplifting in a department store in a large neighboring city in April of 1917. Technically the charge was larceny of a waist, and she was released upon the payment of six hundred dollars bail furnished by her husband. She was at once brought to her home in the city of Milwaukee. On the advice of her counsel she was referred to The Riverside Sanitarium for observation and study, under suspicion of unsoundness of mind.

In any study of the criminaloid, while due regard must be given to investigation of the *crime*, psychology and psychiatry find it vastly more essential, or at least equally important to correct diagnosis to study the *person* and to this end I shall examine the entire life history of the individual.

The patient is a married woman, 28 years of age, of auburn type, 5 feet 6 inches tall and weighs 120 pounds. She has been married five years and is without children. Her parents came from Canada and Ireland. They are both living, the father in good health, the mother an invalid for the past ten years; regarding this invalidism it is stated that she is irritable, cranky, and nervous, that she cannot

walk, and suffers from hysterical palsy. Her father was always a steady whiskey drinker although not a drunkard. Of her own immediate family she states that she has one sister and brother, and that both of them are perfectly well and normal.

A paternal great aunt suffered from a depressed psychosis for many years and died in an asylum. A daughter of this aunt became insane between 16 and 17 years of age and is now living in an asylum, and a son, though not in an asylum, is insane. Her paternal grandmother was peculiar, given to sulking, would go to bed for long periods of time without adequate reason and has always had to be indulged. Four paternal uncles died of cerebral hemorrhage. A second cousin of the patient was apparently an idiot, for she states that he walked on all fours and acted like an animal. Two maternal aunts suffered from goitre. Her paternal grandmother was a drinker. Both of her father's brothers were hard drinkers.

The patient herself was born at full term, her weight at birth being between three and four pounds. She began to talk for the first time at three years of age.

In her *childhood* the patient suffered from scarlet fever, whooping cough, tonsillitis, and diphtheria, and, following an attack of diphtheria at nine years of age, was entirely paralyzed for a period of one year. As a child she suffered from chorea and night terrors. She exhibited many fear states, was especially afraid of the clouds on the horizon, and thought that they were hands stretched out to catch her. She would show delirium upon slight rise of temperature. She was a moderately healthy child but not robust.

She was graduated from the eighth grade at 11 years of age, was apparently precocious, and because of her high marks in school was called "*the hundred in the shade*." She finished high school at 16 years of age, attended the Normal School for two years and received full credit as a teacher at eighteen. She had the customary religious education of the Catholic Church and Sunday School, but was disobedient, suffered from bad temper, and was very frequently punished.

Menstruation occurred at 14 years of age and there were no unusual physical or mental states, and no sexual vices at that time. From 14 to 21 she was highly nervous, suffered from chorea, from anesthesia over the left side of her body, was emotional and given to the perverse impulse of laughing at the wrong time, especially at funerals. She has suffered from childhood up to the present time from a rhythmic, spasmodic wrinkling of the forehead, in all probability a convulsive tic.

As a young woman her disposition was fair, she was somewhat bashful and self-centered, was cheerful and intelligent, had a few beaux but in general cared little for the male sex. She was wilful, disobedient, a natural liar, but studious and industrious in her

school work, was neat in her person but disorderly in her room. She was highly sensitive, emotional and impulsive, given to romancing, and ever believed that she was going to marry "a handsome man with a velvet coat." She fatigued easily, her adaptation to environment was poor. She had little regard for consequences.

Between 18 and 19 years of age, she received an injury to her head while playing basket ball and was unconscious for 18 hours. From 21 years of age on she describes herself as being a lean, muscular girl with normal vegetative functions, but with poor endurance. For many years she has suffered from constant twitching and turning of the head, and extreme nervousness. Four or five years ago she suffered from some form of lung trouble and had two or three hemorrhages. Six years ago the patient suffered from insomnia, acquired the morphine habit which persisted for eight months, but finally *broke off the habit entirely and without medical aid.*

At present the patient's muscular development is fair and her general nutrition good. Her chest development is but 30 inches; unusually small for one of her height. There is no tattooing, no deformity. The palate is normal, but she has two supernumerary canine teeth. Her respiratory organs are normal, likewise the circulatory apparatus. There is nothing abnormal in the urine. The dynamometer test in the hands consistently and upon repeated tests shows greater power in the left hand than the right, the proportion being 55 to 15. The patient is left-handed. The knee jerks are normal, there is no ankle clonus, no Babinski. The pupils are normal. There is no sensory disturbance at this time.

Her *instincts and tendencies* are for the most part sociable and generous. She suffers from no illusions or hallucinations, no incoherency of ideas or loss of memory; she is without delusions and aside from a certain periodic mental state which I will describe later and the essence of which is impulsivity, excitement, and exaltation, coincident with a tendency to make regular pilgrimages to or crusades on a certain large department store purely as an antidote for this excitement, she shows no other proneness to loss of self-control.

So far as neighborhood conditions and home life go it may be said that she is married to a man about 25 years older than herself, her home life is happy and the surroundings good. She has all of the comforts and many of the luxuries of life and denies any domestic infelicity.

The patient has a good-sized cranium, symmetrically developed, with a normal cephalic index. The cheek bones are high, the expression of the eyes frank and open, hair auburn, complexion fair, carriage erect, she is immaculately dressed and altogether attractive in appearance and pleasing in personality. She exhibits a visual

or auditory associative anomaly, in which letters and words spontaneously evoke a sense of color, which I shall describe at length later on.

Her criminal history reverts to 5 years ago when she appropriated a shirt waist from a department store in a large neighboring city, and turned it in to the claim office for cash, giving as a pretext that she had reconsidered the matter and desired a return of the purchase price. She states that her peculations, which were always performed in exactly the same manner, occurred thereafter about every two or three weeks.

She was first arrested in October of 1914 by one of the department store detectives, was released upon bail and the case was settled out of court upon the payment of \$700 totaling, as they estimated it, the amount of her accumulations during this period of time. Two weeks after this settlement she again resumed her peculations from the same department store and was again arrested for larceny in October of 1916. She was sentenced to the Bridewell for 60 days and again her husband settled with the mercantile house for 670 dollars.

Within three weeks from the termination of her sentence in the Bridewell she had resumed her former habits, the details of which were in a measure modified, and successfully so for a period of six months, when she was again arrested as previously stated, in April of 1917.

Questioned as to whether she had a full recollection of what she had done she replied that she had such recollection, was fully acquainted with every step of the procedure, which was always planned, recognized the feelings which actuated her impulses, and remembered the dates fully; and the subsequent narrative of her entire history demonstrated the exactness of her statements, and a faultless memory concerning the details of her pleasurable and exciting adventures.

Asked next whether she knew the *nature* and *quality* of her acts, and that they were wrong, she replied that she knew that she had no right to appropriate to herself those things which did not belong to her, that she knew furthermore that it was against the law, and constituted an offense for which under the law she was rightly punishable.

On the face of this preliminary talk with the patient it would appear then as a perfectly ordinary case of chronic, habitual, and instinctive criminality. As to the details, she either appropriated merchandise in a department store, or purchased an inexpensive article of wearing apparel, changed the price mark to double or treble the true price, returned the articles to the credit desk, and obtained money under misrepresentation and false pretense, and I suppose, under the law, which presumes upon the existence in

normal individuals of the operation of a power of choice and freedom of action of the will, which determines responsibility, that she knew the nature of the act she was doing, knew that it was wrong, and that legally and morally she was guilty of a punishable crime. However, at this time I am more interested in the personality of my patient, in a detailed narrative of her criminal history, in her motives, in the degenerative neurologic picture which she presents, than I am in any particular inquiry into the determination of and application of the law, or upon the propriety or impropriety of postulating responsibility or irresponsibility on the nature of possible "irresistible impulse" if this be an excuse, for I am well reminded of that learned English judge before whom the plea of "irresistible impulse" was pleaded as an excuse for murder, when he said that he had no doubt that all crimes were committed under impulse more or less irresistible, but for the very same reason the law of England had an irresistible impulse to hang a man for committing the crime of murder.

Questioned as to how her thefts, or, with poetic license, her kleptomaniac tendencies originated, she states that upon one occasion, some five years ago, while she was living in this large neighboring city, she had visited this department store in that city, had purchased a ten-dollar waist, but lost the tag from it and desired to return the waist. She took the waist back to the proper department and the floor walker was called. There was no difficulty about returning this garment for the saleslady remembered the waist; but the floor walker explained to her that they had had a great deal of trouble with shoplifters who purchased articles, brought them back and defrauded the store. Then he proceeded to explain to her the method or scheme of fraud, how the person would purchase a cheap article and steal an expensive one, then mark the tag and slip as though the expensive article had been purchased, and, taking it back to the credit desk, upon reasonable representations, would receive the full cash value of the stolen garment.

The following week the patient determined upon and followed out this system exactly as the floor walker had described to her. She purchased a cheap waist and appropriated an expensive one, retired to a secluded part of the store, altered the purchase slip, re-marked the tag, and secured from the credit desk the amount of money reputed to be the cost of the waist. There was in this fraudulent manipulation ordinarily a profit of six to ten dollars. She continued this practice every two or three weeks for a while and then every week until about a year and a half had elapsed when she was first arrested.

The patient states that nothing daunted, she started the same scheme two weeks after her arrest, pilfering from the same store and securing money from the same clerk at the credit desk. After

her second arrest, and while still out on bail, she returned to the store, appropriated articles from one counter and threw them back of another, or took them to the women's waiting-room and threw them into the waste basket, and she felt an especially keen inspiration to perform these acts if she noted the presence about of house detectives, for by this time she had become quite well acquainted with the detective personnel of the store. She would appropriate articles and hide them in the corner near the stairs and watch for their discovery, and she experienced a definite satisfaction and relief in her overwrought and tense emotions in the entire situation. The articles appropriated always consisted of children's clothing, of waists or kimonas. She states that she felt less impulse to do these perverted acts if the house detectives were not about, and that the impulse to perform these acts while they were near was very strong. She was not conscious of any feeling of enmity toward or dislike for these officials, for she says they were always very courteous; but she took keen pleasure and delight in the annoyance and discomfiture which she caused them.

She would go into the presence of the very one who had arrested her and drop her pocket book or handkerchief near him, to discover if he would notice or recognize her, feeling confident that he would recognize her if he glanced up; again she would sit down next to the detective, knowing that if he but turned around he would catch her eye and understand; but she states that she was never successful in completely satisfying her feelings in this perverted manner, for either the stupidity or short memory of the detectives was always at fault, and she was never recognized.

She would try and tempt the girl at the credit desk to look up at her, she would purposely refuse to answer when asked her name so as to cause the clerk to glance up, or she would dilly-dally about, pull a sleeve of the waist inside out, for the purpose of stimulating the clerk's recollection. She well knew that the clerk had been warned to watch for her, and she laughs over this attitude for she cannot herself comprehend it, since such behavior is contrary to what any sensible person would do, desiring to avoid detection.

She describes a scene in the waiting-room when three detectives were together discussing a theft on the part of one of the employees. She seated herself nearby, listening to the conversation, and continued waiting while they called one of the head men. This overseer hurried away and she went in another direction, approaching him so that he would have to pass her, and putting out her foot she tried to trip him, knowing that, if he looked at her, he would recognize her instantly, but the patient states that he did not look up, simply tipped his hat and went on. This was a great lark and gave her much satisfaction.

The day that she was arrested she declares that she could have

escaped if she had made the effort, for she was at the credit desk turning in a stolen article and noticed the detective coming toward her from across the room, but she took the chance that he would not look up. The man recognized her instantly and she was arrested.

She relates a number of adventures in which she placed a cheap tag on an expensive article, or vice versa, and took it to the credit desk to see if the change would be detected. If she had an expensive tag on a cheap article all that was said was that she had been overcharged; but when she tried to return an expensive article with a cheap tag on it nothing was said at all. The devilish iniquity of her glee in pinching at the nerves of a department store's business conscience was constantly in evidence.

Upon a few occasions she would tear up the check she received for purchased or stolen articles, and then report that she had lost the check. Every department would be notified and the check looked for and if not found in thirty days a duplicate would have to be made out. She tells us that there is a great deal of red tape connected with the making out of duplicate checks, and that she has spent as much as an hour and a half in the office before the check could be made out. She thoroughly enjoyed the annoyance and bother she put the clerks to, adding to their work in the pretense of failure to remember the amount of the purchase price, the date, etc. She compelled them to look up all the details.

She usually left Milwaukee about seven or eight o'clock in the morning and remained in this neighboring city until two or three o'clock in the afternoon when she returned to Milwaukee. She would gladly have remained until the store closed, but she knew that she had to be home early so that her husband would not ask questions.

In describing her feelings, her emotional state, her impulses, etc., immediately preceding her crusades upon that department store, she states that for a period of possibly twenty-four hours prior to her expedition she was nervous, irritable, upset, appetite would be poor and she would think of going, and dream of going, and that while there were no unusual head feelings, she did suffer fairly constantly with pain in the back of the neck. She was simply determined to get down there and, although she was conscious of the fact that what she was about to do was not right, she was nevertheless certain that nothing could keep her back. She wanted to go, and was bound and determined that nothing could stop her, the only detail which required consideration being that of planning the journey so as to escape the intervention of her husband.

She explains that the pleasure, excitement, and gratification came in returning the articles to the credit desk, because there was chance, hazard, and risk in it. The theft of the articles in themselves produced no enjoyment that she was conscious of, because

it was a very simple and easy matter, and it lacked all risk. The greater the risk, the greater the satisfaction.

Describing her sensations at greater length in this department store, she states that she felt like a child going to a circus, hurrying from the elephants to the lions, then to the monkeys, all excitement and saying to herself, "I won't stay here long, I am going on to the next place," and, after going all over, she would be sorry that she had not remained longer at each place. She wanted to go back and do it all over again.

After her return each night she felt completely exhausted, but the following day would be perfectly happy, free of all exhaustion, contented and emotionally stable, and would remain in this condition until the first of the next week when she would again begin to plan her periodic excursion.

So far as relates to the value of the stolen things, she tells us that this was quite immaterial; that she would secure as much pleasure in purchasing a five-dollar article and having it exchanged for two dollars. The money she secured, which was quite a considerable amount in the five years of her unusual career, for the most part she gave away, surrendered to anyone who had a hard luck story. Her husband wondered at times how she happened to have money when she had not asked him for any for quite a while, but she was never without an excuse.

Upon two occasions she made her trip to this store and returned empty handed, for once the elevator she was in dropped some distance, and this upset her so that she could not go through the store. Another time she twisted her ankle and this too disturbed her so that she could not go on. In her estimation, these accidents apparently served the purpose of nullifying the desire, and quenching the excitement.

The highest value of anything that she ever stole was 14 or 15 dollars and the lowest one dollar; but the average value was 7 or 8 dollars.

While undergoing sentence at the Bridewell she made the acquaintance of a professional shoplifter, who learning the patient's history suggested that she join a gang of professional thieves, headed by a man who was a notorious crook, to the end that she might this way realize something from her talents. It was held out to her that all she would have to do would be to obtain suits, furs, coats, diamonds, etc., and turn them over to the chief crook, who would relieve her of all the trouble and risk of cashing in, and would dispose of the articles at a profit to all of them. My patient was dumbfounded and horrified at the idea. She could not possibly get herself to turn in an article that some other person had stolen, nor could she give an article that she had stolen to another to turn in. This angle of the process appeared to her to be all wrong,

criminal, and wicked, it would be downright thieving, the essence of which was the intent. She disclaimed and specifically denied any such low motive or intent in herself, while readily agreeing that, objectively, there was no apparent difference at all between stealing as a profession and stealing as an adventure and in obedience to a state of mind.

CHROMESTHESIA.

Before summarizing this rather unusual history and at the expense of the criticism of disorderly presentation, I want to call your attention to a most interesting visual or auditory associative anomaly which was disclosed by the patient during her stay at the sanitarium. This anomaly consisted in a subjective perception of color associated with letters, words, and names. As the patient herself expressed it, "names have half or quarter tones of color, as, for instance, some letters have a full tone and will influence and shade the remaining letters in the name to such an extent that the name will be a shade of the color of the prominent or strong letter." I have listed below her color alphabet.

A—A yellow or gold, luminous and translucent. Thick and fat and round, full of energy.

B—A weak black—like an unpainted house, not much gray in it, opaque.

C—White but translucent, about the color of white of an egg boiled about one minute, very flat surface.

D—Silver, flat surface.

E—Gray, neutralizes any other letter to which it is annexed, lacks character or stamina.

F—Yellow of brass, has vitality like A but to a less degree.

G—Pale tan, no life.

H—Red, strength, rugged, but lacks beauty.

I—Looks like water.

J—Brown like chocolate, thick, greasy.

K—A blue of faded blue overalls, very thin, cold.

L—A pea green, faded, but full of life and energy, similar to A, F.

M—Red—but purple mixed with it as rouge on a woman's cheeks on a cold day, or red nose which has blue in it. Dull, lacks energy.

N—Color of clay, partly red, partly brown. Less dull than M.

O—Very much like B, only gray.

P—Green, color of green apple, is thick and has life.

Q—Looks like lemon *juice* (not the lemon).

R—Purplish red, like M, but purple predominates in R, and in M, red is the stronger.

S—Greenish yellow, sulphur color, thick and solid.

T—Muddy water.

U—Pale brown.

V—Light pink.

W—Color of fire.

X—Drab, gray, thick.

Y—Clear pale red, transparent.

Z—Like X, gray only has less character.

These colors are not fixed, and in the combination of letters the color becomes a floating mass with more or less life, dependent on the letters involved. For instance A beautifies any word or name, and tones or shades any word used to express happiness, care-free; pleasure should contain A, just as sorrow is expressed better by words lacking A; *gloom* is more depressing than *sad* through the elimination of A. P, F, L, G, Q, S in order named contain the same element of joy, but A has it in the highest degree; no word with letter A can be wholly discordant, or repulsive. Ignatz—the only thing that saves this name is the A; without it, it would be unspeakably ugly, as it is, it is only homely.

D, B, T, X, I, E, B weakens any combination, making the shade less strong; in other words, sap the strength of the color. C stands for purity, clearness. H, F, M, N, R, Y, W, K are all strong, heavy colors. For instance, the name Harry, a combination of red, purple, relieved only by yellow—A. Monday, dark and gloomy; also Thursday. Friday, Saturday, and Tuesday, cheerful, happy colors, yellow, greenish yellow, pale green. I once told a priest that I thought people would feel more sorrowful if Christ were crucified on Monday or Thursday instead of Friday. He punished me by making me stand all day through Sunday School class. He thought me flippant, and I thought him stupid.

Jones—Dull Brown, S is outweighed by J and N.

Carson—Light pale green, sometimes changing to yellow.

Newton—T neutralizes N and E, does same to W, result pale brown.

Frank—Pale yellow with blue.

John—Brown and red, dull.

Luke—U takes from L and result drab.

James—Golden brown, yellow.

Mary—Reddish pink.

Clara—Golden white.

Irene—Blue, purple.

Carrie—Dirty gray, dish water.

The color created by these names is always a mass moving and shading from lighter to darker tints, proportionate to the amount of life the strongest letter in the name contains, just as when listening to a many-pieced orchestra one hears the music as a whole, although conscious in a remote degree of the various pieces. When

you concentrate the mind on the flute or violin the music changes. In the same manner, separating the names into the different letters, the result is different than grouping or massing of the same. *Karl* has more strength than *Carl*, being white or weakening to the beauty or A, while K strengthens.

One hears the name of a person and immediately summons to mind a picture of said person. The name suggests certain colors, the colors in turn suggest certain characteristics, thus we have formed a certain mental picture before ever seeing the individual. Upon meeting the person one sometimes feels a vague disappointment or quite a distinct *shock*. Why? Nothing has been said previously to help our mental picture, and yet there is a wide variance between person and picture and, unconsciously, we blame the person, not our own mental picture.

Combinations of certain colors form a disagreeable shade, oft-times; as plates decorated in a pinkish, blue, lavender, create a nauseating feeling, causing an instant loss of appetite. "Fond as I am of ice cream, I cannot eat it if of a pinkish blue color. I cannot eat Weber's bon-bons, as this color is so frequently used. I dislike a woman for no other reason than that she always wore a changeable silk petticoat of this shade."

My patient states that she cannot remember when she did not associate colors with words and letters, both written and spoken. She has no theory as to the development of this associative condition, and she does not think that it is in any way related to her method of schooling. I tried to discover whether her subjective perception of color was primarily determined by a visual or auditory stimulus but without success, for she herself has never definitely determined whether the color association comes from the appearance of the printed word or whether the word is subconsciously pronounced, nor whether, in ordinary conversation, she does not visualize the spoken word. With respect to musical tones she states that there is a certain perception of color, but not to the same degree, although musical compositions played in sharps seem yellow, while in flats, clear white or gray. A voice which sings flat produces a subjective sensation of purplish red, while a violin played off key—out of tune—induces a perception of yellow, as in the skin of a lemon; but each note or key has no definite shade of color as words have. The patient indicates that letters, words, and names do not carry a visual appreciation of color but rather a subjective perception of color.

At night this patient cannot distinguish pink from yellow, or green from blue, and she constantly calls gray, brown by day as well as by night.

It may be interesting to hear what the patient has to say about her early experiences in color perception. She states that when

in the first grade in school the teacher had a chart with painted birds, and below these painted birds she would write the names such as crow, oriole, bob white, etc. The teacher would spell the word, point to the picture above and, in this manner, drill the children so that in a short time every child could spell the birds' names and find them on the chart. This she could not do. She could spell crow when asked to do so without the chart, but she could not pick out the bird, as c-r-o-w meant a gaily colored bird—not a black one—and she would choose some bright plumaged bird and call it crow. In like manner the oriole did not mean yellow and white, but either dark brown or red and black. The teacher would urge her to describe a crow, and her description would cause an uproar in the class room. She states that later on she learned to associate the names of the birds by the general shape of the body. Continuing, she says, "When I first learned to spell, wishing to surprise my father when dessert time arrived, I said to mother, 'Tell Anne to bring in the *S. P. Cat!*' which to me meant green apple pie. Needless to say both parents looked at me in astonishment and to my utter disgust I had to tell them that *S* and *P* looked green and yellow, and *cat* like *pie*. Mama said 'But you could have said *was* or *ball*—why did you choose *cat*? Of course I could not explain the reason except that '*S. P. Cat*' looked like green apple pie—while '*was*' and '*ball*' did not." Later on this patient discovered that if any name escaped her recollection, such as Holmes, she would never search through the H's as Ha, He, etc., but could remember in a vague way the general color of the name and in this way could promptly recall it.

In searching the literature, I find that the condition or anomaly which I have just described is not so unusual as one might expect. It has been variously described as Synesthesia or Chromesthesia and I find, furthermore, that it has existed not alone as a pure color audition, but as well where numerals and pure form have evoked the sense of color.

In the *American Journal of Ophthalmology* under the title of color-music, the statement is made that, since the time of the Jesuit Lewis Bertrand Castel, observations and investigations upon this peculiar condition have been made, particularly to establish a definite relationship between color and sound.

"There are many points of resemblance between color and music. Briefly stated they are:

1. Color and musical sounds are both produced by vibrations acting upon the nerve terminations of the eye and ear respectively.
2. Both are limited to a certain range of visible and audible vibrations, and there are certain numerical relationships in these which may or may not be of a psychologic significance.

3. Both are largely dependent for their common, mental or psychological effect upon relative degrees of harmony or discord.

4. Combinations and sequences of notes or tints in both are capable of affecting us emotionally and giving us pleasure and pain.

5. Both are capable of adding interest to and deepening or lessening mental impressions received from other sources.

A. Wallace Remington of London has constructed an instrument which he has called a color-organ, in which the spectrum in the analogue of the octave" as follows:

Approximate color	Deep red	Crimson	Orange crimson	Orange	Yellow	Yellow green	Green	Bluish green	Blue green	Indigo	Deep blue	Violet
Musical Notes	Middle C	C#	D	D#	E	F	F#	G	G#	A	A#	B

He compares the number of color and sound vibrations on this scale, with middle C, corresponding to the lowest red of the spectrum.

In the *Lancet* of 1898, W. S. Colman describes a similar condition in an article on "Colour Hearing" and concludes, upon the investigation of a number of cases, of the phenomena they are "associated sensations, analogous to the shivering experienced at the sight or thought of the squeak of a slate pencil." He finds the condition more common in males than females, and considers that early education has no influence on its development. He furthermore finds that the condition is frequently hereditary.

Baratoux explains the condition of color audition upon the supposition that the color center may be aroused, not only by stimuli transmitted from the retina, but by impressions received through the other senses.

In the *Edinburgh Medical Journal* of 1894, Geo. E. Thorp in an article entitled "Color Audition and Its Relation to the Voice" describing the condition in himself, which he speaks of as a gift, states that in the singing of the word "Holy" the "Ho" was dark brown and "ly" light gray. He believes that the gift of color audition is an absolute guide in obtaining the desired quality of tone, and therefore of value to a musician. He further concludes that the phenomenon is not a mere association of the idea of color with the tone but an actual sensation.

Blumel in his book entitled "Stammering and Cognate Defects of Speech" printed in 1913, considers the entire subject as a curiosity of mind, and calls the associational process Synesthesia and this particular form of association Chromasthesia. He states that many people associate colors with taste, yellow, may be salt; green,

acid; red, peppery, etc. He quotes Galton's description of association between numerals and colors; "up to 30 I see numbers in clear white; to 40 in gray; 40 to 50 in flaming orange, etc." Galton himself states that in many cases the letters of the alphabet, particularly the vowels, are invested with color and goes on to describe this vowel imagery:

"A—Pure white, like china in texture.

"E—Red, not transparent; vermilion with china white would represent it.

"I, like bright yellow; gamboge" etc., and concludes that the phenomenon is visual as well as auditory and associative.

In the *American Journal of Psychology* of 1892 and 1893, Professor Frederick Starr, describing this condition, gives the complete alphabet and their associative colors. He suggests as an explanation a crossing or mingling of the fibers of the auditory and visual nerves, which explanation, however, he neither urges nor rejects.

In volume XII of *Ophthalmology*, 1915 and 1916, George Henry Taylor, speaking of "Color and Moral Sense," draws the conclusion that there is a strong relationship between color sense and moral sense, "The emotional type in the highest degree is the type in which there is found a keen appreciation of color. A person may be deaf to musical sounds, blind to color, and blind to an appeal of moral sense, and still have an acute and intelligent mind. To an uneducated person the appeal of music is emotional, to a highly educated musician there is a greater appeal to the mind." He further draws the general conclusion that as a color-blind person can by education name color with a degree of accuracy in shade and brightness, so similarly a moral-blind person can by education recognize moral sense by a something analogous to the color-blind sense of shade and brightness.

Observations Relating to the Patient's History.—In any consideration of the subject of this essay there are certain striking and outstanding features in her history which may be summarized as follows:

1. The parental history exhibiting alcoholic, degenerate, and insane tendencies.

2. The personal history showing marked delay in early development, and later on precocity, hysterical stigmata, tics, neurotic and fear states, and a history of severe injury to the head at eighteen years of age.

3. The present physical and nervous condition displaying decided neuropathy.

4. Perception and reasoning faculties unimpaired.

5. The condition of mind of the patient preceding, during and subsequent to her criminal excursions, which is peculiarly morbid,

accompanied by marked mental unrest, excitement, exaltation, and an irresistible craving.

6. The lack of or insensibility to moral opposing feelings.

7. Disregard for consequences.

8. The reason ascribed for her criminal acts, namely the satisfaction of a desire.

9. The overpowering strength of the prompting desire.

10. Other than the satisfaction derived in the glamour of her crusades, which satisfaction was found in blind obedience to an obsessed mental state, the motivelessness of such criminal acts.

11. In her criminal history, the limitation of her activities to a single department store where many others were available.

12. Her unusual color associative anomaly.

It might be possible, of course, to consider the career of my patient as that of the erotic kleptomaniac. One could select from her early life her disregard of the opposite sex, her avowed sexual frigidity in general, the character of the stolen articles, namely waists, kimonas, under-clothes and children's clothing, ordinarily considered sexual fetiches, her day dreams of marrying a "handsome man in a velvet coat," the motivelessness of her thefts other than the satisfaction of a desire, and postulate thereby a symbolic sexual picture, where the general gratification consisted in stealing and handling the articles unconsciously associated in the mind as sexual equivalents. However, in this patient I find no special gratification in the handling of the stolen articles and, as a matter of fact, this is denied specifically; still I am conscious of the fact that, even if true, such a state of things is never spontaneously avowed.

The Freudian school in general believes that "all kleptomania is a manifestation of erotic symbolism, and that the object stolen is a symbol of the sexual object unconsciously desired." All of which is very interesting, but the trouble with it all is that in the case of my patient it is not true. Fetichism if it exists at all in this patient is unrecognized by her. The stolen articles happened to be the most accessible for her purpose, she did not hoard them up, she did not take them to bed with her, but to the cashier's desk. It was definitely in the glamour of the entire situation, the gamble and risk, that satisfaction and relief was gained through the purposeful indulgence of a strong and overpowering impulse.

Similarly one might speculate as to the origin of this condition upon the presumption of moral imbecility. If moral imbecility has as a background a family history of alcoholism, insanity, and idiocy, if it exhibits itself in premature depravity, in lying and stealing, if signs of degeneracy, both psychic and physical, also a condition in which chorea, left-handedness, convulsive tics, emotional instability, inaccessibility to correction, and incorrigibility in

the life history of the individual exist, and are of congenital origin, and if, in addition, the subject has no *real* insight into the right and wrong of her particular derelictions, where natural remorse and shame are absent and irresistible cravings persist, then, to this extent, moral insensibility exists, and we may rightly conclude, I believe, that we are in the presence of a condition of so great a degree of particularized mental defect as to reasonably constitute moral imbecility. Moral imbecility is not moral insanity.

The subject of this paper is not insane. She is not a victim of irresistible impulse, but rather of "irresistible cravings." The law determines what constitutes criminality and legally she is, of course, a criminal, but I find it most difficult to classify her in either the Born, Habitual, or the Insane Criminal group, for she lacks the essential symptoms which warrant us in so classifying her. I am convinced of the hysteroneurasthenic picture which she presents and in those periodic, exalted, impulsive, perverse moods, and mental states she exhibits, whether illustrative of the epileptic equivalent, of hysteric perversion, or of moral imbecility. Her criminal acts are doubtless the direct outgrowth of her defect, plus the influence exerted over her in the suggestion first acquired from the floor walker and, to this extent, she might be called a criminal by accident, even though predisposed. So many circumstances surrounding her peculations show such an utter disregard of self, of consequences and of inhibited or suspended judgment, morally obtund though intellectually clear, that one is forced to the belief that she is, at such times, under the dominance of a morbid desire over which she has practically no control. One other circumstance may have a bearing upon this history which is that her criminal history of the past five years directly corresponds with the period of her married life, during which time she has lived a life of ease, residing in hotels, and boarding houses, without responsibilities, without the wholesome influence of the daily use of the broom, and the scrub-brush, performing practically no physical work at all.

Beyond this I have little more to add except a statement of her subsequent conduct. It was her own suggestion that she be removed far enough away from this one great department store so that it would be impossible for her to reach it and return in one day, since she was convinced that therein lay the solution of her relationship to society. The suggestion was followed—she is now doing hard work as a stenographer in a university of a neighboring state where the hours are long, the service constant, and there has been no recurrence or recidivation to former habits. Doubtless the mental states have recurred and will continue to recur until

she has discovered another and a different mode of successfully combating her irresistible cravings. Possibly she will find that hard work in itself will be the solution of the problem, for it may be discovered that luxury and idleness constitute a poorer medium for the elimination of morbid energy than vigorous exercise with the broom and the scrub-brush.

CERTAIN CAUSES OF BLEEDING DURING PREGNANCY— THEIR SIGNIFICANCE AND TREATMENT.*

By JAMES LINCOLN HUNTINGTON, M.D., Boston, Mass.

The sudden and unexplained loss of blood is sufficiently appalling to the average individual to demand a prompt call for the physician. Therefore this symptom is brought early to the attention of the practitioner. Certainly the first duty of the physician, when summoned in a case of bleeding, is to immediately see the patient and determine the cause and the amount of the hemorrhage.

Bleeding during pregnancy may occur and be of the gravest importance even before the patient suspects that she is in this condition—yes, even before she has skipped a catamenial period; and this brings us to the question of the symptoms of extrauterine pregnancy, or rather to the significance of bleeding as an early symptom of extrauterine pregnancy.

When a woman in the childbearing age complains of abdominal pain, associated with irregular bleeding, no matter what relation this bleeding bears to her regular catamenial cycle, extrauterine pregnancy must be excluded as a possibility before the patient is released from the closest observation.

As the subject of this paper is bleeding during pregnancy and the treatment of the same, we will not go into the question of those rare cases of ectopic pregnancy without bleeding. Usually the story is one of irregular bleeding, beginning after pregnancy has been suspected, associated with pain low down in either quadrant; the blood is apt to be dark and the flow scant and irregular. Graves¹ describes the typical onset of ectopic pregnancy as a sharp attack of abdominal pain, so severe that the patient may fall, followed by faintness and pallor and shortly afterwards by moderate uterine bleeding. Findley² says: "When a woman of the child-bearing age, whose menstrual periods have been regular and painless, goes from four to twenty days over her time and then sees blood from the vagina that is dark and clotted, and suffers from pain in one or the other side of the pelvis or in the hypogastric region, it is presumed that she is suffering from an ectopic gestation."

What should be the subsequent treatment of a patient presenting these symptoms? First of all, careful vaginal examination—and often where there is voluntary resistance this requires an anesthetic. If confirmatory evidence is obtained, such as a boggy mass

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in one or both vaults with a slightly enlarged uterus, the patient should have an early laparotomy; and the time for this operation will depend upon the patient's condition and the facilities for operating. If confirmatory evidence is lacking, the patient must be kept under close observation as long as these symptoms continue and be examined again to note any change. Sometimes the signs and symptoms of this condition are so nearly identical with those of miscarriage that a diagnosis is only reached after the curette has demonstrated an empty uterus.

This brings us to the question of the second cause of bleeding which I wish to discuss. What should be the treatment of a patient, presumably early in normal pregnancy, who begins to bleed? If the patient has been seen before, or if there is definite cause seen for the bleeding, such as trauma, over-exertion, or excitement, or if there is not the slightest history of pain and no tenderness in the lower quadrants, it would seem to me safe to put off making the vaginal examination, provided that the patient can be kept under close observation. My reason for this feeling is that by following such advice an occasional miscarriage will be avoided. Where these conditions do not exist, I feel with Titus that³ "the danger of converting a threatened into an inevitable miscarriage is far outweighed by the possible finding of some other condition causing the flowing."

If patients during pregnancy would observe great care and remain quiet at the times when their periods would naturally have occurred—or when, because of a history of irregularity that cannot be done, at least remain quiet when they have symptoms suggesting pelvic congestion—flowing would less frequently occur. But flowing, no matter how scant, should always necessitate absolute rest in bed under close observation, with morphine if it continues, or if there is evidence of uterine contractions, until all flowing has ceased for at least three days. Then gradually get the patient up and about at the end of eight days. Then make a vaginal examination to make sure that the uterus is still pregnant and is in normal position.

When the flow continues in spite of treatment, should it become profuse at any time, a curettage should be immediately performed, as alarming hemorrhage may occur unless this is done.

When the flow trickles on day after day, the pulse and temperature must be carefully watched as well as the character of the discharge, so that at the first evidence of infection the uterus may be cleaned out; and in these cases it is always well to swab out with iodine after the uterus is empty.

When a miscarriage occurs in the first month or two of pregnancy, before the placenta has really become a definite structure (as it does in the third month), if it is complete, I should agree with

Titus⁴ that “. . . rest in bed to favor involution is all that is needed.” There will be no flowing to amount to anything and the uterus will be well shut down. But great care should be exercised to be sure that it is really a complete miscarriage. As Cragin⁵ so clearly and graphically points out, in the complete abortion “. . . the embryo will be found enclosed in its sac of amnion and chorion, with the luxuriant chorionic villi surrounded by more or less of the decidua and covered with more or less blood.” In very early miscarriage, where a so-called intact ovum is passed, the patient is left to expel most of the chorionic villi and all the decidua, prolonging the convalescence and exposing the patient to the risk of infection and the possibility of serious hemorrhage. It would seem much safer to curette these early abortions unless one is quite certain, by a careful inspection of the mass expelled, that it is a complete abortion.

After the placenta has been formed it is much easier to determine whether the entire uterine contents has been passed, and for that reason curettage is not so necessary in the fifth and sixth months of pregnancy; in fact at this stage the curette should rarely be used, and then most guardedly, for the uterus has become thinned out and the finger is the instrument best fitted to clean out the remnants of placenta left behind.

After the fifth month, if the uterus is going to empty itself, pain rather than bleeding will be apt to be the first sign of uterine activity.

After the first half of pregnancy bleeding unassociated with painful uterine contractions should make us think of placenta praevia or of separated placenta.

Placenta praevia has been generally considered the most serious emergency of the last half of pregnancy. There are three types: the marginal, the partial, and the complete or central, depending upon the amount of os covered by the placenta. The first two types may cause no symptoms; on the other hand they may be as alarming as the third, depending entirely upon the size of the sinuses exposed.

What are the symptoms of placenta praevia? Painless bleeding in the last half of pregnancy; often starting in with a minute show from time to time; occasionally by a profuse hemorrhage. De Normandie⁶ says: “A placenta praevia announces itself by bleeding without pain, without apparent cause; not infrequently while the patient is sitting or lying down; quite commonly she is awakened by the warm blood trickling down the vulva.”

What is to be the treatment? All too often the physician pays no attention to the early signs and reassures the patient, and it is not until the bleeding has become a profuse hemorrhage that adequate steps are taken to diagnose and treat the emergency.

The first thing necessary is to make a diagnosis, but here again the exact method by which a diagnosis is to be obtained deserves careful consideration. A provisional diagnosis must be made. Arnold⁷ says: "Painless hemorrhage, occurring in the last three months of pregnancy, is always a positive indication for placing the patient in a hospital if it is at all possible to do so." This is sound advice, and where hospital surroundings cannot be obtained, all should be in readiness in the home for the treatment of placenta praevia before a finger is introduced into the vagina to ascertain the cause of the bleeding. The projection of the too inquisitive finger into the os of the patient with central placenta praevia has been immediately followed by uncontrollable hemorrhage. When this fact is realized, the necessity for great gentleness and caution in making the examination is manifest.

As soon as the diagnosis is positive, as revealed by a boggy mass in the lower uterine segment between the wall of the cervix and the presenting part, the only conservative treatment is the prompt emptying of the uterus.

Newell⁸ says: "In rare cases, where the life of the child is of supreme importance, it may be allowable to attempt to carry on the pregnancy up to a point where there is distinct hope that a living child may be obtained; but this can only be fairly done under hospital conditions, where a recurrence of the hemorrhage can be met by a prompt evacuation of the uterus, without loss of time and with full understanding on the part of both parents that the next hemorrhage may prove fatal to both mother and child before operative relief can be given."

This brings us to the question of treatment. De Normandie⁹ says: "In order to gain time to complete preparations for delivery, to check or to lessen a severe hemorrhage and to start labor, a tight vaginal pack of sterile gauze is not infrequently permissible." Arnold¹⁰ says: "Tamponing is the thing that will usually be undertaken, and in my opinion it is the thing that should be undertaken in the majority of cases, notwithstanding its rather general condemnation." He goes on to describe exactly the technic to be followed: "The membranes must be ruptured first; the packing must be done deliberately—and under an anesthetic whenever possible. The palmar surface of the gloved hand is the ever-ready and best speculum, over which squeezed-out pledgets of cotton or gauze are carried by means of dressing forceps, not into the os but around it, as high in the vaginal fornices as the finger-tips can press it; and this is backed up by completely filling the vagina, piece by piece, in the same manner, and placing over the vulva suitable pads and a T- binder, while the uterus is held down from above by a tightly-drawn abdominal binder. It may take a little longer to do it this way, but it means the difference between success and

failure, often between life and death." This certainly is a perfect description of how the packing should be applied in such cases where the vaginal route has been chosen as the path by which the uterine contents are to be removed, for unfortunately the control of the immediate hemorrhage is but a fraction of the problem. What are the methods to be employed? *Accouchement forcé*, bi-polar version, Voorhees bag, vaginal and abdominal Cæsarian section.

Accouchement forcé—manual dilatation of the cervix—Newell selected as the operation of choice in 1911:¹¹ "Manual dilation of the cervix, whether partial or complete, is usually easy in cases of central placenta praevia, and slow dilation by means of bags or vaginal packing involves, in my opinion, an unjustifiable waste of time and blood." De Normandie¹² in 1917 writes in regard to placenta praevia: "I would not give you the idea that I favor unreservedly a manual dilation. I do not; but in certain cases I know it is justifiable, if not the operation of selection." Titus¹³ only allows this operation for multiparae in the seventh or eighth months, who are bleeding so vigorously that time is a large element in the case, and then only in those cases where the cervix is soft and easily dilatable. Arnold¹⁴ considers that "any method is dangerous that requires the rapid dilation of the peculiarly friable placenta praevia os," and advises dilating only to a point where two fingers may be admitted. It would seem to me that only in those cases where the os is partially dilated and very dilatable should this operation be chosen, for the danger is great and the other avenues of escape from calamity offer better chances for both mother and child.

Bi-polar, or Braxton Hicks, version was Newell's¹⁵ choice in 1911 for cases in which the child was not viable. Arnold¹⁶ states that bi-polar version was the choice in the Schauta Clinic in Vienna for all cases of placenta praevia. It undoubtedly is as safe as any procedure for the mother, if properly done; the main objection is the very high fetal mortality, for which reason it would seem better to reserve it for cases where the baby's chances were nil, or so small as to be negligible as compared to the slightest added risk to the mother.

The Voorhees bag, particularly De Normandie's extra large bag, offers a little better chance for the baby—10 to 15 percent, according to Arnold. The technic is simpler than that of the bi-polar version, and the amount of dilation of the cervix does not have to be quite so great.

Vaginal Cæsarian section has a very narrow field in placenta praevia. It is unsuited for cases at term and is contra-indicated wherever the placental site includes the anterior lip of the cervix.

This brings us to the last choice in the treatment of placenta

praevia—namely, abdominal Cesarian section. Certainly the weight of authority looms large against this operation. Arnold¹⁷ states that in the two great clinics in Vienna some three or four years ago, Cesarian section for placenta praevia was rarely or never resorted to in one, and was a rarely-accepted third choice in the other. Newell,¹⁸ in 1911, finds but a small place for its use, save where there exists some other condition calling for Cesarian section. DeNormandie¹⁹ says: "In the rare picked case it is the operation of choice. There are, however, certain facts which must be known before it should be attempted: the mother must be in good condition and under no suspicion of being septic; her soft parts must be rigid; and the baby must be in good condition." Boyd²⁰ reserves Cesarian section for those cases showing a rigid cervix and a complete placenta praevia, and even here he does not admit that there is any strict indication for Cesarian section other than a contracted pelvis. Titus²¹ regards abdominal Cesarian as the operation of choice in any case where the placenta is completely over the os, or even nearly so, where the patient is a primipara; and often the operation of choice in a multipara as well where the child is viable. It certainly has great advantages, and it would seem to me that where the diagnosis is made with the patient still in good condition and the child alive and viable, it offers the best solution in all primiparae and in multiparae not in labor—always provided that they have not been infected by vaginal manipulation.

Premature separation of placenta: In this condition there are supposed to be several widely separated etiological factors. Williams²² sums up the situation as follows: "As the result of my investigations and study, I am prepared to admit that trauma may occasionally be a causative factor; that I know nothing of the effect of mental emotions; that endometritis, when present, is merely an accidental complication; but that there probably exists some indirect connection between the toxemic processes and the accident in question." Williams lays emphasis on the frequency of the condition, considering it quite as common as placenta praevia; and he considers the board-like consistency of the uterus a practically certain sign of premature separation of the placenta; also the importance of the hemoglobin as an index to the patient's condition. De Normandie²³ lays emphasis on abdominal pain as being of striking importance and of most valuable diagnostic worth; he also mentions the change in the size and shape of the uterus, the pallor and the absence of change in the pulse. Vaginal examination shows a normal lower segment of the uterus, thus eliminating placenta praevia.

We have covered the points of diagnosis; let us see what the pathological condition is. Of course, where the etiological factor is trauma, we are dealing with normal uterine muscle; and after

the uterus is empty, if the patient is still alive the chances for a favorable outcome are good. With the toxemic type the uterus is anything but normal, as Williams has pointed out. It is the seat of multiple intra-muscular hemorrhages of varying size, some being microscopical; these hemorrhages and the resulting degeneration account for the atonic condition of the uterus after it has been emptied. Williams²⁴ considers that these hemorrhages into the uterine tissue are probably due to "lesions of continuity in some of the smallest arterioles."

Where the diagnosis of separated placenta has been made, what shall be our treatment? In the first place, the attending physician must bear in mind the gravity of the emergency and the imperative necessity for a prompt diagnosis and immediate emptying of the uterus where the symptoms are progressive. Of course, a partial separation may occur and there may be a little bleeding, but with absolute rest under the closest observation, all will be well and the patient will continue to term. The general condition of the patient and the amount of blood lost will be the deciding factors.

Where the patient's condition is serious and the amount of blood lost extensive, the baby is of course dead, and the problem is how best to attempt to save the mother. The condition of the cervix is of the utmost importance as a guide to the proper conduct of the case. In a multipara with a soft cervix and some dilatation, the vaginal route is the easiest and probably the best, unless we have evidence of toxemic complications, when it would seem wiser to do a laparotomy, so that should the uterus be absolutely atonic, hysterectomy can be resorted to, as it is the only means of saving the patient. Where the symptoms of toxemia are lacking and the patient's condition fairly good but the cervix only slightly dilated, a bag may be used to complete dilatation more rapidly. Where the patient is not in labor and the cervix unchanged, it would seem a clear indication for Cesarian.

In a primipara, unless the cervix is entirely taken up and so soft as to be really easily dilated, Cesarian section is the only operation to be considered. The following case of my own illustrates this condition:

CASE 521.

Primipara; aged 25; last catamenia Aug. 31, 1915.

Seen first December 10, 1915; nothing abnormal noted, save that her systolic blood pressure was 150; patient was evidently nervous; urged patient to return promptly with specimen of urine.

December 17, 1915. Systolic blood pressure, 118; urine normal, 1012, alkaline O, O.

January 13, blood pressure, 110; urine normal, 1025, O, O.

February 10, blood pressure, 122; urine normal, 1013, neutral, O.

March 9, blood pressure, 140; urine normal, 1016, acid, O, O.

I was considerably concerned about this blood pressure and would not allow the patient to leave my office until I had examined the specimen of urine. Finding this normal, after careful questioning I decided that there must be some nervous element in this rise of blood pressure, as was the case presumably some three months before. But I cautioned her to inform me promptly should any untoward symptoms arise. Early in the morning of March 15, the patient was seized with severe abdominal pain, nausea and vomiting. Both she and her husband stated that she had been as well as usual until just before retiring, when she complained of some pelvic discomfort suggesting menstrual pains. She went to bed and slept until after 1 A. M., when she was awakened by this severe abdominal pain and a desire to move her bowels. She had several loose movements and vomited several times. As I was with another patient I could not very well leave, I asked her to call her family physician, as the case sounded like an acute gastrointestinal upset. He called me up and said that such was his diagnosis, but that her pain was so severe that he had given her morphia subcutaneously. An hour or so later the patient began to bleed. Unfortunately I could not persuade the family to bring her to a hospital, and it was necessary for me to go fifteen miles out into the country in a storm so severe that the trains were not running on schedule. When I saw her she was almost saffron yellow, her fundus was well above the umbilicus and of board-like consistency; no fetal heart-sounds could be heard. She had by that time lost over a pint of blood and yet her systolic blood pressure was 170 and her pulse 68. She was nearly blind. In spite of repeated doses of morphia, the pain in her abdomen was still severe. Dark blood was dribbling from her vagina. I sent her immediately to the nearest hospital, some six miles away. Upon entrance, as soon as she could be prepared, I catheterized her and made a vaginal examination. I obtained about three ounces of dark urine, which showed almost solid albumin by the nitric acid test. Vaginal examination showed an unchanged lower uterine segment with a long intact cervix. The abdomen was prepared by a dry shave and the skin sterilized with iodine. Upon opening the peritoneal cavity, the uterus showed a curious dark color, smooth and lustreless, with wavy lines of black running through it. Its peculiar marking and dull color reminded me of the appearance of a dead mackerel. The uterus was opened and a large blood clot and lifeless 6½-months fetus and placenta were rapidly evacuated. By this time the patient had received two ampules of aseptic ergot and one of pituitrin. The uterus showed no tendency to shut down for about ten minutes, but it did not bleed profusely. A second ampule of pituitrin was given, and the uterus slowly regained tone and the abdomen was closed and the patient put back to bed with a

pulse of 90 and a systolic blood pressure of 140. Her kidneys began to secrete promptly and twelve hours after operation 10 oz. were obtained by catheterization—normal, 1,024, acid, large trace of albumen, 0 sugar, 0 bile. Twenty-four hours after operation her temperature, which had been normal, rose to 103 and her pulse to 130, and forty-eight hours later she died, with all the symptoms of general peritonitis. Autopsy was not permitted, but consent was given for the abdomen to be opened in the line of incision. A culture of the peritoneal fluid was taken and gave a pure culture of streptococcus. The uterus was small and hard and not flecked with fibrin. The liver was remarkable; it was almost the consistency of dough and pale salmon in color. A piece was removed and examined by Dr. Hinton, the State Pathologist, who gave the following report:

Gross Examination.—Piece of liver about 5 inches in largest dimensions, of doughy consistency, and of yellowish-grayish-brown color.

Microscopic Examination.—There is no normal liver tissue. The periphery of some of the lobules show swollen liver cells, with faintly staining nuclei. The remaining part of the tissue generally shows shrunken cells, with poorly staining nuclei. Many of the cells show vacuolization and extreme granular degeneration.

Diagnosis.—Acute toxic degeneration of the liver.

Bleeding at any time during pregnancy is a symptom which may be of gravest import. It always demands immediate careful investigation by the physician to whose care the patient has intrusted herself. Should the physician be at a loss to find a satisfactory explanation, or be in doubt as to the course to pursue, it is his moral duty to summon the assistance of one more experienced in dealing with these cases. Time is an element of greatest importance, and often a question of only a few hours will decide between a successful outcome and overwhelming tragedy.

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TWO CASES OF MYXEDEMA.*

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CASE I.

Case of myxedema under thyroid medication, changing to syndrome of exophthalmic goiter, and returning to nearly normal under rest and tonic treatment.

I was called to see this patient on February 15, 1915, and found the following: the patient stated that she did not believe there is any goiter or myxedema in the family. She has three children and they are well. They had the usual diseases of childhood. She gave the following account of her present trouble:

In 1910 she weighed 240 pounds, and because of not feeling well she had been taking tablets for the last years. She described them as "sheep tablets." In 1914 her weight had decreased to 170 pounds, and she was very weak and had no endurance. She had taken those tablets off and on up to the first of the year 1915. The patient complained of extreme weakness, inability to do her work; could not even walk upstairs to her bedroom, it being necessary for her husband to carry her up at night and down in the morning. Her heart palpitated violently at times, and her hands and arms and lower limbs jerked frequently. Her appetite was poor, the least effort caused her to get out of breath, and she suffered from dizziness and headache in the morning.

The physical examination showed a poorly nourished woman about 57 years of age, weighing 97 pounds. The heart action was rapid, no murmurs, and the pulse ranged between 130 and 160; the least exertion causing the heart to beat more violently. The pulsation could be seen and felt in the neck. The neck was prominent, the enlargement being lateral and anterior. Her appetite was poor, and at times she suffered from diarrhea, and passed large quantities of urine. Any exertion, even walking to another room, caused more or less dyspnea. Her skin perspired easily. There was considerable general tremor, and choreiform movements on effort. The muscular weakness was apparent, as the patient's legs would give way when she attempted to walk; in fact, she could not walk on a straight line nor perform the Romberg test because of this weakness. The deep reflexes were all increased; the eyeballs were prominent, the pupils dilated, and on testing with flash-

*Read before the meeting of the Alienists and Neurologists, Chicago, July, 1917.

light there was a quick response to light, but pupils would not hold down. A vibratory tremor of the eyeballs was noticed on testing for the fields of vision. Mentally she was in a state of great anxiety regarding her condition, and at times would cry.



Fig. 1.



Fig. 2.



Fig. 3.

Case I.—Fig. 1, 1910; weight, 240 pounds. Fig. 2, February 15, 1915; weight, 97 pounds. Fig. 3, April, 1915; returning to normal.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.

Case II.—Figs. 4, 1905; aged 25; good health. Figs. 5, 6, 1912; aged 31; features changed. Fig. 7, March 1, 1913; aged 32; date of admission to hospital; hair coming out. Figs. 8, 9, May 30, 1913; aged 32; after three months under thyroid.

On looking over the literature regarding toxic symptoms of thyroid medication, we find a few references concerning accidental use of the gland, also experimental results. Klose injected dogs

with the juice squeezed from goiter taken from patients with exophthalmic goiter. The animals constantly developed a transient syndrome, with the blood-findings of exophthalmic goiter, and exophthalmos in some instances.

Baruch, by injecting ground human goiter material into the peritoneal cavity of dogs, rabbits, and rats, induced a syndrome in many instances closely resembling exophthalmic goiter.

Notthaft mentions a patient, male, 43 years of age, who, on his own responsibility, had taken thyroid extract for obesity. Within five weeks he took nearly 5,000 grains of the extract. When examined, the patient had marked exophthalmos, with both Stellwag's and Von Graefe's signs; the thyroid was enlarged and pulsated, and there was a thrill over it. Tremors were present and the pulse was 120 to the minute.

A. E. Elliott (*Am. Jour. Med. Science*, 1907) writes: "The administration of thyroid gland substance, or thyroid extract, is capable, if given in sufficient amounts, of inducing a toxic state which in almost every essential is similar to Grave's disease." Auld, Beclere, Edmunds, and other were able to produce this syndrome in animals.

Reid Hunt (*Jour. Amer. Med. Assn.*, 1907) says: "The immoderate or careless administration of iodothyryn to susceptible individuals may produce symptoms characteristic of Grave's or Basedow's disease."

CASE II.

Myxedema with intoxication symptoms recovering under thyroid treatment.

Male, 32 years old, admitted to Jacksonville State Hospital in 1913. His condition began in 1908 following mental shock. His mother has an exophthalmic goiter.

The physical examination showed a well-built man who is weak and easily exhausted. The face appeared swollen, but did not pit on pressure. There was some epistaxis. Facial expression was drowsy; the skin of the whole body was dry, rough, scaly, and wrinkled in places. The ends of the fingers were blunted or clubbed. The hair on the head was dark and scanty, and looked as if it had been pulled out; it was also lusterless, dry, and brittle. The eyebrows were scant. The pulse was slow (60). The features were clumsy and coarse, and the lips thickened. His movements were slow, and large pads of what seemed to be fat could be seen and felt above the scapula and on sides of the abdomen. His appetite was poor, and he suffered with constipation. When eating or talking he would sometimes bite the buccal mucous membrane; the articulation was indistinct, thick, and monotonous; speech slow

and labored. This patient's hands were large, also the calves of the legs; his gait was slow, labored, and stooping.

The mental examination showed hallucinations of hearing, delusions, disorientation, clouding of consciousness, and emotional reactions. The blood examination showed marked reduction of red blood cells and hemoglobin.

The patient was placed under thyroid extract, 5 grains at first; this was gradually increased to 30 grains a day. Under this treatment the bulky appearance of the body slowly disappeared, the intellect cleared, the skin became normal, perspiration normal, the nails changed appearance; the old hair fell out and fine new hair came in; the gait improved and speech became normal. The patient began to take an interest in surroundings and felt well. At present this patient is teaching school in the West, and when last heard from was taking 2 grains of thyroid daily.

THE LIMITATIONS OF LOCAL ANESTHESIA IN SURGICAL OPERATIONS.

By LEIGH F. WATSON, M.D., Chicago.

Local anesthesia has its limitations as has any other method of anesthesia. It cannot be successfully employed for every operation nor can it be used on all patients. In some instances it is not suited to the temperament of the patient; in others, the operation is one that should not be attempted by local anesthesia alone. The variety of major operations that is possible to be completed by local anesthesia, depend upon a proper selection of cases and the experience of the operator; his patience, his gentleness in handling tissues, and special training in the method.

Essential for Success.—The first requisite for the successful use of the local method is an accurate knowledge of the nerve supply, and the ability of the operator to block off completely every sensation of pain. When the nerve supply cannot be entirely controlled general anesthesia should be employed.

The sensation of pain is confined to the skin, nerve trunks, parietal peritoneum, and synovial membrane of joints. Lennander has demonstrated that all internal organs obtaining their nerve supply from the sympathetic and vagus, below the branching of the recurrent nerve, have no sensation. For this reason the abdominal and pelvic viscera are insensitive to heat, cold, pain, and pressure, both in health and disease. There is no sensation of pain in bone substance, bone marrow, cartilage, tendon, articular surface of bone covered with cartilage, brain, lung, liver, heart, kidney, kidney pelvis, ureter, bladder serosa, and intestine. A slight twinge of pain is felt when blood vessels are cut. Traction on the ligaments of the thoracic, abdominal, or pelvic viscerae will cause pain; traction on the mesentery, besides producing pain, will cause epigastric discomfort and nausea. I have frequently noted the pain of ligating the meso-appendix when it has not been previously blocked with local anesthesia.

Solution, Syringe, Needles, Etc.—Novocaine, one-fourth percent solution, or cocaine one-tenth percent solution, is strong enough for any operation. Adrenaline (1:10,000) five minims to the ounce of anesthetic solution is usually employed to give prolonged anesthesia. The drug must be sterile, and dissolved in sterile normal salt solution, being freshly prepared for each operation, and of a definite strength, that the operator may know at any time the exact amount of anesthetic that has been used. Cocaine and

novocaine can be sterilized by heating to 212 degrees F.; a temperature above this, as well as repeated sterilization, is injurious.

Different operators prefer various syringes. I have found an all metal syringe holding 10 cc. very serviceable. The syringe should take a slip needle to facilitate rapid refilling. The needles must be kept sharp and clean; the smallest size should always be used for the initial infiltration of the skin.

Advantages.—As there is no danger of post-operative pulmonic, cardiac, or nephritic complications following local methods, many emergency operations can be satisfactorily and safely performed in the patient's home. Either at home, or in the hospital, the patient should be made comfortable on the operating table, which should be well padded with extra blankets or quilts; a hard table will quickly cause him to become tired and restless. As there is no necessity for speed with the patient conscious and comfortable, fewer assistants are required than with general anesthesia.

Many patients will consent to operation under the local method who would not consider it if it involved a general anesthetic; this applies especially to those who have had a stormy and protracted convalescence after taking ether.

Allen sums up the advantages of the local method as follows: absence of fear of the anesthetic; absence of post-operative disturbances; no danger of post-operative dilatation of the stomach or of tympanites; no post-operative backache; no vomiting and straining to weaken abdominal incisions; no necessity to starve the patient before hand—the regular post-operative nourishment of debilitated patients is not interfered with.

Contraindications.—The local method is positively contraindicated in the patient who does not want it—who prefers for any reason to be asleep during operation. It is a mistake to urge local anesthesia on the skeptical, and without exception, I administer a general anesthetic to this type of patient.

When there are intra-abdominal adhesions or when the condition is one in which the nerve supply cannot be completely blocked, as is the case in deep pelvic or abdominal operations, a general anesthetic is indicated.

Allen says, "Local anesthesia is actually contraindicated only in children, epileptics, and highly nervous or neurotic subjects. The loss of consciousness is not necessary for the successful performance of an operation, and with the patient's restlessness and possible anxiety allayed by a small preliminary dose of morphine, or morphine and hyoscine, the fact that the patient is conscious becomes a negligible factor for the successful completion of the operation."

Scope of Local Anesthesia.—In selecting the anesthetic for a major operation, one must first of all consider the life of the pa-

tient. Local anesthesia adds greatly to the safety and comfort of the young and robust, and when the patient is handicapped by old age, shock, hemorrhage, pulmonic, nephritic, or cardiac lesions, the local method is especially indicated if he is to be given the greatest chance for recovery.

Operations on the Extremities.—In dislocations, fractures, and amputations of the fingers and toes a simple infiltration around the base of the digit is all that is required for successful analgesia. For operations above the wrist and ankle, the regional nerve block method of Matas is most satisfactory and quicker than local infiltration.

Operations on the Skull.—Trephining, exploratory craniectomy, mastoidectomy, and removal of depressed fractures are easily performed under local anesthesia, greatly to the safety of the patient. The bone, dura, and brain substance, are insensitive. Infiltration anesthesia of the skin, fascia, muscles and periosteum, is all that is needed.

Major Abdominal Operations.—All forms of inguinal, femoral, ventral, and umbilical herniae can be operated on under local anesthesia. A general anesthetic is never indicated except in children and the neurotic. For strangulated hernia in patients with lowered vitality, the local method is a necessity, to eliminate the additional shock of general narcosis.

Interval cases of appendicitis, selected cases of acute appendicitis can often be completed under local anesthesia if the mesenteric nerve block technic is employed.

In selected cases I have completed the following operations under local anesthesia: Herniotomy, appendicectomy, nephropexy, cholecystotomy, suprapubic cystotomy and prosectomy, gastroenterostomy, colostomy, resection of the tubes and ovaries and shortening the round ligaments.

Perineorrhaphy, trachelorrhaphy and cystocele operations can usually be performed under local methods.

DIAGNOSTIC AND THERAPEUTIC NOTES.

ETHER-OIL ANESTHESIA BY THE RECTUM.—Page and White report their experience in 47 cases with this method, originally introduced by Jas. T. Gwathmey of New York. The following is the technic. A simple washout of the bowel an hour or two before the injection in addition to the usual preliminary dose of medicine, is an advantage, but can be dispensed with if necessary. A subcutaneous injection of morphia gr. $\frac{1}{4}$, atropine gr. 1/100, half an hour before the time fixed for the ether-oil injection. From 20 to 25 minutes before the time of operation 6 ounces of a mixture containing two parts of ether to one of oil (ether 4 ounces, oil 2 ounces) are slowly run into the rectum. Six minutes are spent in making this injection. The indiarubber catheter is passed 3 or 4 inches into the rectum, never more than 4 inches. When the operation is finished, the remaining ether-oil must be washed out, using a large rectal tube and funnel. The washout must be done thoroughly and methodically, as on this depends the rapidity with which the patient recovers consciousness. I do the washing-out, unless I have shown a nurse how to do it. The tube is gradually passed up and as much as possible of the remaining ether-oil mixture withdrawn. The tube is then drawn down again near the anus, and some water or saline is run in and siphoned off. This is repeated gradually higher up the bowel until no oil or ether can be detected in the returning fluid, when the tube is gradually withdrawn lower and 3 ounces of olive oil are passed in and left there. The temperature of the water or saline must not be above that of the rectum—in fact, only the chill off.

Following the use of this technic there have been no rectal, pulmonary, or gastric sequelae. The return of consciousness is not delayed when the washing-out is done satisfactorily.

Soldiers, unless they are very ill, are resistant to the effect of ether, and there is also the loss of ether in the breath, from the venous blood as it passes through the lungs, so that to procure a full anesthesia in a reasonable time it is often necessary to administer a little ether with a Clover's apparatus and allow some re-breathing; if preferred, either by the open method or some A.C.E. can be given. If it has not been possible to give the injection 20 minutes before the time for operating some anesthetic vapor by the mouth will certainly be necessary for induction to prevent delay. After surgical anesthesia has been produced nothing more will be required by the mouth in a large number of cases. The anesthesia obtained is quiet and even and the laryngeal reflex is present. In some cases an occasional whiff of chloroform must be given in the usual way with a Junker's apparatus, but of course much less chloroform is required than with the usual methods, and there is the continual even stimulation from the ether absorbed from the rectum, so that with ordinary care there is practically no increased danger.

White remarks that the results have been uniformly good both as regards the condition of the patient during the operation and as regards the absence of untoward symptoms afterwards.

While the method is especially recommended for operations about the face, mouth and nose, the reporters have used it in abdominal operations, exophthalmic goitre, laminectomy, and amputation of the breast.—*The Lancet*, October 27, 1917.

TREATMENT OF SO-CALLED PERNICIOUS ANEMIA.—Barker and Sprunt discuss briefly the classification of the severe anemias, their etiology and pathogenesis, and describe a regimen used by them in the Addison-Biermer type of pernicious anemia which they define as a hemolytic anemia of as yet unknown etiology. They report that in one group of cases they have had a favorable response on applying the regimen they describe, whereas in another group of cases, indistinguishable before applying the regimen, an unfavorable response was met with.

This regimen, summarized, includes:

1. Treatment in a private room in a hospital or nursing home.
2. Isolation and complete rest in bed under the care of a special nurse and the physician.
3. Careful search for focal infections, and radical surgical removal of any such infections found (especially of infections of the teeth and gums).
4. Milk diet at first, followed by rich diet rich in protein, the patient being encouraged to eat despite lack of appetite, and disregarding any consequences that may follow the ingestion of the food.
5. An abundance of fresh air, the bedroom windows being kept constantly open when the patient is inside, and the bed being run out upon an open porch in all suitable weather.
6. Dilute hydrochloric acid with and after meals on account of the gastric anacidity, followed three hours after each meal by 45 grains of pancreatin and 45 grains of calcium carbonate. If the pancreatin is not easily taken by the patient, it is omitted as one of the less important features of the treatment.
7. Arsenic, usually in the form of cacodylate of soda or small doses of salvarsan, is administered as a routine. When cacodylate is given, 50 milligrams are injected intramuscularly once a day for eight days, and after an interval of two weeks a second course of eight injections is given.
8. Massage thrice weekly is given while the patient is in bed. When the hemoglobin reaches 60 percent, gentle exercises are begun in bed; when it reaches 80 percent, the patient is allowed gradually to sit up and to take gentle exercise in the open air.
9. Blood transfusions are employed only in patients who on admission have a blood count below 1,000,000 or who after a trial of several weeks of the above regimen have not shown distinct improvement.

Splenectomy has not been used in the series of cases mentioned. To the paper are appended the case summaries and blood charts of seven illustrative cases.—*Johns Hopkins Hospital Bulletin*, November, 1917.

TREATMENT OF RECENTLY INFLICTED WAR WOUNDS WITH FLAVINE.—A report on the treatment of some 120 recent war wounds occurring in 70 soldiers has been made to the Medical Research Committee by Drummond and McNee, with an introduction by Surgeon-General Bowlby. The following were the conclusions:

1. Flavine appears to have many advantages as a primary treatment of recent war wounds. Among the advantages are: (a) the absence of all toxicity, even in large wounds. (b) The prevention of suppuration and of spreading sepsis, as brought out in our series of test cases. (c) The primary dressing need not be changed for two or three days, and is then easily and painlessly removed; this may be of great advantage during severe fighting, where rapid evacuation of wounded from front to base is required without unnecessary dressing of the wounds. (d) The wounds are not inflamed or painful, and the surrounding skin is never irritated.

2. Emphasis must be laid on the fact that excision of damaged tissue and mechanical cleaning of the wounds are necessary preliminaries to the use of the flavine.

3. Flavine cannot be classed as a success in the treatment of the later stages of war wounds. The wounds tend to assume a stagnant condition, during which the process of repair is almost in abeyance. After a few days, when the danger of gas gangrene and of spreading sepsis have to a great extent passed off, flavine should be stopped and another treatment adopted.

4. In the majority of cases, war wounds are not rendered bacteriologically sterile even by the prolonged use of flavine.

5. Test-tube experiments carried out with organisms isolated from actual wounds bear out the strong antiseptic properties of flavine, and their enhancement in the presence of serum. Coliform bacilli, which are a common infection in the later stages of wounds, are much more resistant to the action of the antiseptic in test-tube experiments than any of the other types of organisms examined in this way.—*The Lancet*, October 27, 1917.

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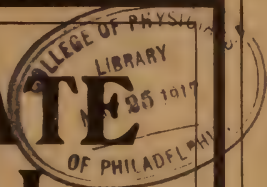
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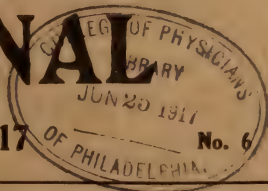
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COLLECTIVE ABSTRACTS

(Critical Editorial Reviews of Recent Literature in Collective Form)

The X-Ray in Thoracic War Surgery—A Review of Certain Recent Literature, with
Special Reference to Localization and Extraction of Foreign Bodies. . . *E. H. SKINNER*

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NOVEMBER, 1917

No. 11

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Signed -----
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INTERSTATE MEDICAL JOURNAL

VOL. XXIV.

DECEMBER, 1917

No. 12

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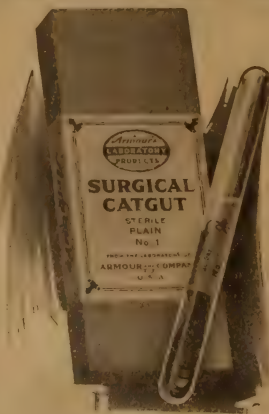
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